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            20                  25                  30
Tyr Gly His Thr Ala Gly Val Thr Lys Gly Asp Ile Ile Thr Val Asp
        35                  40                  45
Glu Ala Gln Thr Met Leu Thr Asn Asp Ile Thr Val Phe Glu Arg Ala
    50                  55                  60
Val Ser Gln Ala Val Ala Val Pro Leu Asn Gln Ser Gln Tyr Asp Ala
65                  70                  75                  80
Leu Val Ser Leu Val Phe Asn Ile Gly Gln Gly Asn Phe Lys Arg Ser
                85                  90                  95
Thr Leu Leu Lys Lys Leu Asn Lys Gln Asp Tyr Val Gly Ala Gly Asn
            100                 105                 110
Glu Phe Leu Arg Trp Thr Arg Ala Asn Gly Lys Val Leu Pro Gly Leu
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Ile Arg Arg Arg Glu Ala Glu Arg Val Leu Phe Glu Lys Leu Gly Ala
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<400> 3

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Trp Gly Leu Ser His Trp Arg Tyr Thr Val Gly Tyr His Ala Ala Asp
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Ala Leu Leu Ala Ala Glu Thr Arg Glu Arg Lys Trp Glu Gln Gln Arg
65                    70                    75                    80
Gln Thr Asp Met Asn Lys Val Ala Ile His Ala Glu Glu Glu Leu Ala
              85                    90                    95
Ala Ala Arg Asp Ala Ala Ala Asp Ala Gln Arg Thr Gly Gln Arg Leu
             100                   105                   110
Gln His Thr Val Thr Thr Leu Gln Arg Gln Leu Ala Ser Arg Glu Thr
             115                   120                   125
Arg Arg Leu Ser Ala Ala Thr Ala Ile Gly Thr Asp Asp Leu Gly Gly
         130                   135                   140
Gln Pro Gly Val Leu Phe Ala Glu Leu Phe Arg Arg Ala Asp Gln Arg
145                   150                   155                   160
Ala Gly Glu Leu Ala Ala Tyr Ala Asp Arg Thr Arg Val Lys Trp Gln
                 165                   170                   175
Ala Cys Gly Arg Ala Tyr Gln Ala Ala Thr His Glu Ala Glu Lys
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Leu Thr Asp Leu Phe Ser Arg Ser Phe Pro Glu Val Lys Lys Ile Thr
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Gly Asp Ser Leu Ser Trp Gly Glu Val Cys Tyr Leu Tyr Ser Gln Ala
     50                    55                    60
Gln His Glu Gln Lys Glu Asn Arg Leu Thr Glu Ser Arg Ile Leu Ala
65                    70                    75                    80
Arg Ala Asn Pro Leu Leu Val Asn Ala Val Arg Leu Gly Ile Arg Gln
                 85                    90                    95
Ala Ala Gly Ser Arg Ser Tyr Asp Asp Trp Phe Gly Ser Arg Ala Asp
             100                   105                   110
Arg Phe Ala Arg Pro Gly Ser Val Ala Ser Met Phe Ser Pro Ala Ala
             115                   120                   125
Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asp Leu His Pro Asp Thr
         130                   135                   140
Ser Leu Phe Arg Leu Asp Ile Arg Arg Pro Asp Leu Ala Ala Leu Ala
145                   150                   155                   160
Leu Ser Gln Asn Asn Met Asp Asp Glu Leu Ser Thr Leu Ser Leu Ser
                 165                   170                   175
Asn Glu Leu Leu Tyr Arg Gly Ile Gly Ala Ala Glu Gly Leu Asp Asp
             180                   185                   190
Asp Ser Val Arg Glu Leu Leu Ala Gly Tyr Arg Leu Thr Gly Leu Thr
             195                   200                   205
Pro Tyr His Trp Ala Tyr Glu Ala Ala Arg Gln Ala Ile Leu Val Gln
         210                   215                   220
Asp Pro Thr Leu Met Gly Phe Ser Arg Asn Pro Asp Val Ala Gln Leu
225                   230                   235                   240
Met Asp Pro Ala Ser Met Leu Ala Ile Glu Ala Asp Ile Ser Pro Glu
                 245                   250                   255
Leu Tyr Gln Ile Leu Ala Glu Glu Ile Thr Thr Asp Ser Tyr Glu Ala
             260                   265                   270
Leu Trp Ser Lys Asn Phe Gly Asp Met Pro Pro Ser Ser Leu Leu Ser
         275                   280                   285
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Tyr Asp Ala Leu Ala Thr Phe Tyr Asp Leu Asp Tyr Asp Glu Leu Thr
290                 295             300
Ser Leu Leu Ser Leu Arg Leu Asp Phe Ser Asn Pro Asn Asn Glu Tyr
305             310             315                 320
Tyr Ile Asn Ser Gln Leu Ser Val Val Thr Leu Asn Glu Ser Thr Gly
                325             330                 335
Leu Ile Thr Ile His His Tyr Leu Arg Thr Leu Gly Gly Asp Ser Gln
            340             345             350
Gln Ile Asn Pro Glu Leu Ile Pro Tyr Gly Asp Gly Thr Tyr Leu Tyr
        355             360             365
Asn Phe Ser Val Val Ser Thr Ile Ser Glu Asp Ser Phe Lys Leu Gly
370             375             380
Ser Leu Gly Ser Asn Ser Ser Asn Leu Tyr Ser Gly Asp Tyr Gln Leu
385             390             395                 400
Gln Lys Gly Val Arg Tyr Ser Ile Pro Val Glu Ile Asp Glu Gly Lys
            405             410             415
Leu Asn Asp Gly Ile Thr Ile Gly Leu Ser Arg Lys Gly Gly Gly Tyr
            420             425             430
Tyr Ser Thr Val Asn Phe Thr Leu Ile Glu Tyr Asp Pro Ala Ile Phe
        435             440             445
Ile Leu Lys Leu Asn Lys Val Ile Arg Leu Tyr Lys Ala Thr Gly Met
    450             455             460
Thr Thr Ala Glu Ile Tyr Gln Ile Thr Asn Ile Leu Asn Asn Gly Leu
465             470             475                 480
Thr Ile Asp His Ala Val Leu Ser Lys Ile Phe Leu Val Arg Tyr Leu
            485             490             495
Met Arg His Tyr Gln Leu Asp Val Ala Arg Ser Leu Ile Leu Cys Asn
        500             505             510
Gly Thr Ile Ser Asp Gln Ala Phe Ser Gly Glu Thr Gly Leu Phe Thr
        515             520             525
Thr Leu Phe Asn Thr Pro Pro Leu Asn Gly Gln Leu Phe Ser Ala Asp
530             535             540
Asp Thr Pro Leu Asp Leu Arg Ser Glu Ala Pro Glu Asp Ala Phe Arg
545             550             555                 560
Leu Ser Val Leu Lys Arg Ala Phe Asn Ile Ser Ala Ser Gly Leu Ser
            565             570             575
Thr Leu Trp Gln Leu Ala Ser Gly Asp Ser Ser Ala Gly Phe Ser Cys
        580             585             590
Ser Ala Asp Asn Ile Ala Ala Leu Tyr Arg Val Lys Leu Leu Ala Asp
    595             600             605
Ile His Asp Leu Ser Ala Gly Glu Leu Ser Met Leu Leu Ser Val Ser
    610             615             620
Pro Phe Ser Gly Val Ala Ala Gly Ser Leu Ser Asp Asn Glu Leu Thr
625             630             635                 640
Gln Phe Leu Tyr Gln Thr Thr Thr Trp Leu Thr Glu Gln Gly Trp Thr
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Val Ser Asp Val Phe Leu Met Leu Thr Thr Gln Tyr Gly Thr Leu Leu
            660             665             670
Thr Pro Asp Ile Glu Asn Leu Leu Ala Ser Leu Arg Asn Gly Leu Ser
        675             680             685
Gly Arg Glu Leu Phe Pro Glu Thr Leu Pro Gly Asp Gly Ala Pro Phe
    690             695             700
Ile Ala Ala Ala Met Gln Leu Asp Ala Thr Asp Thr Ala Lys Ala Met
705             710             715                 720
Leu Thr Trp Ala Asp Gln Leu Lys Pro Glu Gly Leu Thr Leu Thr Glu
            725             730             735
Phe Ile Leu Leu Val Met Asn Ala Ala Pro Asn Asp Glu Gln Ala Gly
            740             745             750
Gln Met Ala Gly Phe Cys Gln Ala Leu Trp Gln Leu Ala Leu Ile Ile
    755             760             765
Arg Ser Thr Gly Leu Ser Thr Arg Glu Leu Thr Leu Leu Val Ser Gln
770             775             780
Pro Gly Arg Phe Arg Thr Gly Trp His His Leu Pro His Asp Leu Pro
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Ala Leu Arg Asp Ile Thr Arg Phe His Ala Val Val Asn Arg Ser Gly
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Ser His Ala Gly Glu Val Leu Thr Ala Leu Glu Thr Gly Glu Leu Ser
             820                    825                    830
Ser Ala Leu Leu Ala Arg Ala Leu Ser Gln Asn Glu Gln Asp Val Thr
             835                    840                    845
Gly Ala Leu Ala Gln Val Arg Gly Ala Gly Glu Gln Asp Asn Ser Val
             850                    855                    860
Phe Thr Ser Trp Glu Glu Val Asp Gln Ala Glu Gln Trp Leu Asp Met
865                    870                    875                    880
Ser Glu Thr Leu Ser Ile Thr Pro Ser Gly Leu Ala Ser Leu Ile Ala
             885                    890                    895
Leu Lys Tyr Ile Asn Val Ser Asp Asp Ser Ala Pro Leu Tyr Ser Gln
             900                    905                    910
Trp Gln Val Val Ser Gly Leu Leu Gln Ala Gly Leu Lys Ser Ser Gln
             915                    920                    925
Ser Ser Ala Leu His Asp Tyr Leu Glu Glu Gly Thr Ser Ser Ala Leu
             930                    935                    940
Cys Ala Tyr Tyr Leu Arg Asn Leu Ala Pro Asn Met Val Ser Gly Arg
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Asp Asp Leu Phe Gly Tyr Leu Leu Leu Asp Asn Gln Val Ser Ala Lys
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Val Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Gly Ile Arg Leu Tyr
             980                    985                    990
Ile Asn Arg Ala Leu Asn Gly Ile Glu Leu Ser Ala Met Ala Glu Val
             995                    1000                   1005
Arg Gly Arg Gln Phe Phe Thr Asp Trp Asp Thr Phe Asn Lys Arg Tyr
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Ser Thr Trp Ala Gly Val Ser Glu Leu Val Tyr Tyr Pro Glu Asn Tyr
1025                   1030                   1035                   1040
Leu Asp Pro Thr Val Arg Ile Gly Gln Thr Gly Met Met Asp Thr Leu
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Leu Gln Ser Val Ser Gln Ser Ser Ile Asn Arg Asp Thr Val Glu Asp
             1060                   1065                   1070
Ala Phe Lys Thr Tyr Leu Thr Thr Phe Glu Gln Ile Ala Asn Leu Asn
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Thr Val Ser Gly Tyr His Asp Asn Ala Ser Met Thr Gln Gly Thr Thr
             1090                   1095                   1100
Trp Tyr Val Gly Arg Ser Ile Thr Asp Gln Thr Asn Trp Tyr Trp Arg
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Ser Ala Asn His Ser Lys Ile Gln Asp Ser Met Met Pro Ala Asn Ala
             1125                   1130                   1135
Trp Thr Gly Trp Thr Lys Ile Asn Cys Gly Met Asn Pro Trp Ser Asp
             1140                   1145                   1150
Leu Val Cys Ser Val Phe Phe Asn Ser Arg Leu Tyr Val Val Trp Val
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Glu Glu Asn Gln Ser Ala Asp Thr Glu Ala Glu Ser Thr Thr Thr Thr
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Gln Gln Ser Tyr Thr Leu Lys Leu Ser Phe Arg Arg Tyr Asp Gly Thr
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Glu Thr Gln Gly Met His Val Thr Cys Asn Pro Leu Thr Glu Gln Leu
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Tyr Cys Ala Phe Tyr Ser Val Thr Ser Lys Pro Asp Phe Asp Asn Ala
             1235                   1240                   1245
Gln Leu Ile Ser Val Asp Asn Asp Met Thr Leu Asn Val Ile Ser Asp
1250                   1255                   1260
Ile Gly Ile Phe Lys Ser Val Ser His Glu Phe Asn Thr Ser Thr Glu
1265                   1270                   1275                   1280
Lys Phe Ile Asn Asn Val Phe Ser Asp Pro Ser Ala Asn Tyr Phe Val
             1285                   1290                   1295
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Leu Leu Thr Pro Glu Leu His Ile Thr Ala Asn Val Ser Cys Phe Val
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Ser Thr Ala Gly Ile Ala Thr Gln Ser Thr Ile Glu Lys Phe Val Gln
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Gly Gly Phe Asp Gly Phe Val Gly Val Asp Val Ser Asn Ser Lys Val
            1380                1385              1390
Tyr Gln Val Gly Lys Glu Ala Val Gly Val Thr Val Lys Ser Tyr Ser
            1395                1400              1405
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Leu Ile Asp Asp Ile Ile Leu Thr Ser Gly Val Asn Gly Thr Glu Ile
            1475                1480              1485
Lys Ser Trp Pro Ser Ala Glu Trp Tyr Asn Asp Lys Leu Ser Leu Gln
            1490                1495              1500
Ser Gly Asn Asn Leu Phe Asn Thr Lys Ser Leu Ser Phe Thr Val Asn
1505                1510              1515                    1520
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            1525                1530              1535
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            1780                1785              1790
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Thr Ala Asn Ser Leu Thr Ala Leu Phe Leu Pro Gln Gln Asn Glu Val
        1810                1815                1820
Leu Lys Gly Tyr Trp Gln Thr Leu Ala Gln Arg Leu His Asn Leu Arg
1825                1830                1835                1840
His Asn Leu Ser Ile Asp Gly Gln Pro Leu Ser Leu Ser Val Tyr Ala
                1845                1850                1855
Thr Pro Ser Glu Pro Ser Ala Leu Gln Ser Ala Val Val Asn Ser Ala
        1860                1865                1870
Gln Gly Ala Ala Ala Leu Pro Ala Ala Val Met Pro Leu Tyr Ser Phe
        1875                1880                1885
Pro Val Met Leu Glu Asn Ala Arg Gly Met Val Ser Leu Leu Thr Gly
        1890                1895                1900
Phe Gly Asn Thr Leu Leu Gly Ile Thr Glu Arg Gln Asp Ala Glu Ala
1905                1910                1915                1920
Leu Ala Lys Leu Leu Gln Thr Gln Gly Ser Glu Leu Ile Arg Gln Gly
                1925                1930                1935
Leu Arg Gln Gln Asp Asn Val Leu Glu Glu Ile Asp Ala Asp Ile Ala
        1940                1945                1950
Ala Leu Glu Glu Ser Arg Arg Gly Ala Gln Met Arg Phe Glu Arg Tyr
        1955                1960                1965
Lys Val Leu Tyr Glu Ala Asp Val Asn Thr Gly Glu Lys Gln Ala Met
        1970                1975                1980
Asp Leu Tyr Leu Ser Ser Ser Val Leu Ser Ala Ser Thr Ala Ala Leu
1985                1990                1995                2000
Phe Leu Ala Glu Ala Ala Ala Asp Met Leu Pro Asn Ile Tyr Gly Leu
                2005                2010                2015
Ala Val Gly Gly Ser Arg Tyr Gly Ala Leu Phe Lys Ala Thr Ala Ile
        2020                2025                2030
Gly Ile Gln Val Ser Ser Asp Ala Thr Arg Ile Ser Ala Asp Lys Ile
        2035                2040                2045
Ser Gln Ser Glu Val Tyr Arg Arg Arg Glu Glu Trp Glu Ile Gln
        2050                2055                2060
Arg Asp Ser Ala Gln Ser Asp Val Ala Gln Ile Asp Ala Gln Leu Ala
2065                2070                2075                2080
Ala Met Ala Val Arg Glu Gly Ala Glu Leu Gln Lys Thr Tyr Leu
        2085                2090                2095
Glu Thr Gln Gln Thr Gln Ala Gln Ala Gln Leu Ala Phe Leu Gln Ser
        2100                2105                2110
Lys Phe Asn Asn Thr Ala Leu Tyr Ser Trp Leu Arg Gly Arg Leu Ser
        2115                2120                2125
Ala Ile Tyr Tyr Gln Phe Tyr Asp Leu Ala Val Ser Arg Cys Leu Met
        2130                2135                2140
Ala Gln Gln Ala Trp Gln Trp Asp Lys Phe Glu Thr Arg Ser Phe Ile
2145                2150                2155                2160
Gln Pro Gly Ala Trp Met Gly Ala Asn Ala Gly Leu Leu Ala Gly Glu
                2165                2170                2175
Thr Leu Met Leu Asn Leu Ala Gln Met Glu Gln Ala Trp Leu Thr Gly
        2180                2185                2190
Asp Glu Arg Ala Ile Glu Val Thr Arg Thr Val Cys Leu Ser Glu Val
        2195                2200                2205
Tyr Thr Ser Leu Ala Glu Asp Ala Ala Phe Ser Leu Ala Asp Lys Val
        2210                2215                2220
Val Glu Leu Val Ser Asn Gly Ser Gly Ser Ala Gly Thr Lys Ser Asn
2225                2230                2235                2240
Gly Leu Gln Met Asp Gln Gln Gln Leu Glu Ala Thr Leu Lys Leu Ala
                2245                2250                2255
Asp Leu Gly Ile Gly Asn Asp Tyr Pro Val Ser Leu Gly Thr Met Arg
        2260                2265                2270
Arg Ile Lys Gln Ile Ser Val Thr Leu Pro Ala Leu Val Gly Pro Tyr
        2275                2280                2285
Gln Asp Val Arg Ala Val Leu Ser Tyr Gly Gly Ser Met Val Met Pro
        2290                2295                2300
```

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```
Arg Gly Cys Ser Ala Leu Ala Val Ser His Gly Met Asn Asp Ser Gly
2305                2310                2315                2320
Gln Phe Gln Leu Asp Phe Asn Asp Pro Arg Tyr Leu Pro Phe Glu Gly
                2325                2330                2335
Leu Pro Val Asp Asp Thr Gly Thr Leu Thr Leu Ser Phe Pro Asp Ala
                2340                2345                2350
Asp Gly Lys Gln Gln Ala Met Leu Leu Ser Leu Ser Asp Ile Ile Leu
                2355                2360                2365
His Ile Arg Tyr Thr Ile Ile Ser
                2370                2375
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<210> 5
<211> 1428
<212> PRT
<213> Serratia entomophila

<400> 5

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Met Gln Asn His Gln Asp Met Ala Ile Thr Ala Pro Thr Leu Pro Ser
  1               5                  10                  15
Gly Gly Gly Ala Val Thr Gly Leu Lys Gly Asp Ile Ala Ala Ala Gly
                20                  25                  30
Pro Asp Gly Ala Ala Thr Leu Ser Ile Pro Leu Pro Val Ser Pro Gly
                35                  40                  45
Arg Gly Tyr Ala Pro Thr Gly Ala Leu Asn Tyr His Ser Arg Ser Gly
                50                  55                  60
Asn Gly Pro Phe Gly Ile Gly Trp Gly Ile Gly Gly Ala Ala Val Gln
 65                  70                  75                  80
Arg Arg Thr Arg Asn Gly Ala Pro Thr Tyr Asp Asp Thr Asp Glu Phe
                85                  90                  95
Thr Gly Pro Asp Gly Glu Val Leu Val Pro Ala Leu Thr Ala Ala Gly
               100                 105                 110
Thr Gln Glu Ala Arg Gln Ala Thr Ser Leu Leu Gly Ile Asn Pro Gly
               115                 120                 125
Gly Ser Phe Asn Val Gln Val Tyr Arg Ser Arg Thr Glu Gly Ser Leu
               130                 135                 140
Ser Arg Leu Glu Arg Trp Leu Pro Ala Asp Glu Thr Glu Thr Glu Phe
145                 150                 155                 160
Trp Val Leu Tyr Thr Pro Asp Gly Gln Val Ala Leu Leu Gly Arg Asn
               165                 170                 175
Ala Gln Ala Arg Ile Ser Asn Pro Thr Ala Pro Thr Gln Thr Ala Val
               180                 185                 190
Trp Leu Met Glu Ser Ser Val Ser Leu Thr Gly Glu Gln Met Tyr Tyr
               195                 200                 205
Gln Tyr Arg Ala Glu Asp Asp Asp Gly Cys Asp Glu Ala Glu Arg Asp
               210                 215                 220
Ala His Pro Gln Ala Gly Ala Gln Arg Tyr Pro Val Ala Val Trp Tyr
225                 230                 235                 240
Gly Asn Arg Gln Ala Ala Arg Thr Leu Pro Ala Leu Val Ser Thr Pro
               245                 250                 255
Ser Met Asp Ser Trp Leu Phe Ile Leu Val Phe Asp Tyr Gly Glu Arg
               260                 265                 270
Ser Ser Val Leu Ser Glu Ala Pro Ala Trp Gln Thr Pro Gly Ser Gly
               275                 280                 285
Glu Trp Leu Cys Arg Gln Asp Cys Phe Ser Gly Tyr Glu Phe Gly Phe
               290                 295                 300
Asn Leu Arg Thr Arg Arg Leu Cys Arg Gln Val Leu Met Phe His Tyr
305                 310                 315                 320
Leu Gly Val Leu Ala Gly Ser Ser Gly Ala Asn Asp Ala Pro Ala Leu
               325                 330                 335
Ile Ser Arg Leu Leu Leu Asp Tyr Arg Glu Ser Pro Ser Leu Ser Leu
               340                 345                 350
Leu Glu Asn Val His Gln Val Ala Tyr Glu Ser Asp Gly Thr Ser Cys
```

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           355                360                 365
Ala Leu Pro Ala Leu Ala Leu Gly Trp Gln Thr Phe Thr Pro Pro Thr
    370                 375                 380
Leu Ser Ala Trp Gln Thr Arg Asp Asp Met Gly Lys Leu Ser Leu Leu
385                 390                 395                 400
Gln Pro Tyr Gln Leu Val Asp Leu Asn Gly Glu Gly Val Val Gly Ile
            405                 410                 415
Leu Tyr Gln Asp Ser Gly Ala Trp Trp Tyr Arg Glu Pro Val Arg Gln
            420                 425                 430
Ser Gly Asp Asp Pro Asp Ala Val Thr Trp Gly Ala Ala Ala Ala Leu
            435                 440                 445
Pro Thr Met Pro Ala Leu His Asn Ser Gly Ile Leu Ala Asp Leu Asn
450                 455                 460
Gly Asp Gly Arg Leu Glu Trp Val Val Thr Ala Pro Gly Val Ala Gly
465                 470                 475                 480
Met Tyr Asp Arg Thr Pro Gly Arg Asp Trp Leu His Phe Thr Pro Leu
            485                 490                 495
Ser Ala Leu Pro Val Glu Tyr Ala His Pro Lys Ala Val Leu Ala Asp
            500                 505                 510
Ile Leu Gly Ala Gly Leu Thr Asp Met Val Leu Ile Gly Pro Arg Ser
            515                 520                 525
Val Arg Leu Tyr Ser Gly Lys Asn Asp Gly Trp Asn Lys Gly Glu Thr
    530                 535                 540
Val Gln Gln Thr Glu Arg Leu Thr Leu Pro Val Pro Gly Val Asp Pro
545                 550                 555                 560
Arg Thr Leu Val Ala Phe Ser Asp Met Ala Gly Ser Gly Gln Gln His
            565                 570                 575
Leu Thr Glu Val Arg Ala Asn Gly Val Arg Tyr Trp Pro Asn Leu Gly
            580                 585                 590
His Gly Arg Phe Gly Gln Pro Val Asn Ile Pro Gly Phe Ser Gln Ser
    595                 600                 605
Val Thr Thr Phe Asn Pro Asp Gln Ile Leu Leu Ala Asp Thr Asp Gly
    610                 615                 620
Ser Gly Thr Thr Asp Leu Ile Tyr Ala Met Ser Asp Arg Leu Val Ile
625                 630                 635                 640
Tyr Phe Asn Gln Ser Gly Asn Tyr Phe Ala Glu Pro His Thr Leu Leu
            645                 650                 655
Leu Pro Lys Gly Val Arg Tyr Asp Arg Thr Cys Ser Leu Gln Val Ala
            660                 665                 670
Asp Ile Gln Gly Leu Gly Val Pro Ser Leu Leu Leu Thr Val Pro His
    675                 680                 685
Val Ala Pro His His Trp Val Cys His Leu Ser Ala Asp Lys Pro Trp
690                 695                 700
Leu Leu Asn Gly Met Asn Asn Asn Met Gly Ala Arg His Ala Leu His
705                 710                 715                 720
Tyr Arg Ser Ser Val Gln Phe Trp Leu Asp Glu Lys Ala Glu Ala Leu
            725                 730                 735
Ala Ala Gly Ser Ser Pro Ala Cys Tyr Leu Pro Phe Thr Leu His Thr
            740                 745                 750
Leu Trp Arg Ser Val Val Gln Asp Glu Ile Thr Gly Asn Arg Leu Val
    755                 760                 765
Ser Asp Val Leu Tyr Arg His Gly Val Trp Asp Gly Gln Glu Arg Glu
770                 775                 780
Phe Arg Gly Phe Gly Phe Val Glu Ile Arg Asp Thr Asp Thr Leu Ala
785                 790                 795                 800
Ser Gln Gly Thr Ala Thr Glu Leu Ser Met Pro Ser Val Ser Arg Asn
            805                 810                 815
Trp Tyr Ala Thr Gly Val Pro Ala Val Asp Glu Arg Leu Pro Glu Thr
            820                 825                 830
Tyr Trp Gln Asn Asp Ala Ala Ala Phe Ala Asp Phe Ala Thr Arg Phe
            835                 840                 845
Thr Val Gly Ser Gly Glu Asp Glu Gln Thr Tyr Thr Pro Asp Asp Ser
850                 855                 860
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Lys Thr Phe Trp Leu Gln Arg Ala Leu Lys Gly Ile Leu Leu Arg Ser
865   870   875   880
Glu Leu Tyr Gly Ala Asp Gly Ser Ser Gln Ala Asp Ile Pro Tyr Ser
              885   890   895
Val Thr Glu Ser Arg Pro Gln Val Arg Leu Val Glu Ala Asn Gly Asp
              900   905   910
Tyr Pro Val Val Trp Pro Met Gly Ala Glu Ser Arg Thr Ser Val Tyr
              915   920   925
Glu Arg Tyr His Asn Asp Pro Gln Cys Gln Gln Gln Ala Val Leu Leu
              930   935   940
Ser Asp Glu Tyr Gly Phe Pro Leu Arg Gln Val Ser Val Asn Tyr Pro
945   950   955   960
Arg Arg Pro Pro Ser Ala Asp Asn Pro Tyr Pro Ala Ser Leu Pro Ala
              965   970   975
Thr Leu Phe Ala Asn Ser Tyr Asp Glu Gln Gln Gln Ile Leu Arg Leu
              980   985   990
Gly Leu Gln Gln Ser Ser Ala His His Leu Val Ser Leu Ser Glu Gly
              995   1000   1005
His Trp Leu Leu Gly Leu Ala Glu Ala Ser Arg Asp Asp Val Phe Thr
     1010   1015   1020
Tyr Ser Ala Asp Asn Val Pro Glu Gly Gly Leu Thr Leu Glu His Leu
1025   1030   1035   1040
Leu Ala Pro Glu Ser Leu Val Ser Asp Ser Gln Val Gly Thr Leu Ala
              1045   1050   1055
Gly Gln Gln Gln Val Trp Tyr Leu Asp Ser Gln Asp Val Ala Thr Val
              1060   1065   1070
Ala Ala Pro Pro Leu Pro Pro Lys Val Ala Phe Ile Glu Thr Ala Val
              1075   1080   1085
Leu Asp Glu Gly Met Val Ser Ser Leu Ala Ala Tyr Ile Val Asp Glu
     1090   1095   1100
His Leu Glu Gln Ala Gly Tyr Arg Gln Ser Gly Tyr Leu Phe Pro Arg
1105   1110   1115   1120
Gly Arg Glu Ala Glu Gln Ala Leu Trp Thr Gln Cys Gln Gly Tyr Val
              1125   1130   1135
Thr Tyr Ala Gly Ala Glu His Phe Trp Leu Pro Leu Ser Phe Arg Asp
     1140   1145   1150
Ser Met Leu Thr Gly Pro Val Thr Val Thr Arg Asp Ala Tyr Asp Cys
     1155   1160   1165
Val Ile Thr Gln Trp Gln Asp Ala Ala Gly Ile Val Thr Thr Ala Asp
     1170   1175   1180
Tyr Asp Trp Arg Phe Leu Thr Pro Val Arg Val Thr Asp Pro Asn Asp
1185   1190   1195   1200
Asn Leu Gln Ser Val Thr Leu Asp Ala Leu Gly Arg Val Thr Thr Leu
              1205   1210   1215
Arg Phe Trp Gly Thr Glu Asn Gly Ile Ala Thr Gly Tyr Ser Asp Ala
              1220   1225   1230
Thr Leu Ser Val Pro Asp Gly Ala Ala Ala Leu Ala Leu Thr Ala
     1235   1240   1245
Pro Leu Pro Val Ala Gln Cys Leu Val Tyr Val Thr Asp Ser Trp Gly
     1250   1255   1260
Asp Asp Asp Asn Glu Lys Met Pro Pro His Val Val Val Leu Ala Thr
1265   1270   1275   1280
Asp Arg Tyr Asp Ser Asp Thr Gly Gln Gln Val Arg Gln Gln Val Thr
              1285   1290   1295
Phe Ser Asp Gly Phe Gly Arg Glu Leu Gln Ser Ala Thr Arg Gln Ala
              1300   1305   1310
Glu Gly Asn Ala Trp Gln Arg Gly Arg Asp Gly Lys Leu Val Thr Ala
              1315   1320   1325
Ser Asp Gly Leu Pro Val Thr Val Ala Thr Asn Phe Arg Trp Ala Val
     1330   1335   1340
Thr Gly Arg Ala Glu Tyr Asp Asn Lys Gly Leu Pro Val Arg Val Tyr
1345   1350   1355   1360
Gln Pro Tyr Phe Leu Asp Ser Trp Gln Tyr Val Ser Asp Asp Ser Ala

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                    1365                    1370                    1375
Arg Gln Asp Leu Tyr Ala Asp Thr His Phe Tyr Asp Pro Thr Ala Arg
              1380                    1385                    1390
Glu Trp Gln Val Ile Thr Ala Lys Gly Glu Arg Arg Gln Val Leu Tyr
          1395                    1400                    1405
Thr Pro Trp Phe Val Val Ser Glu Asp Glu Asn Asp Thr Val Gly Leu
      1410                    1415                    1420
Asn Asp Ala Ser
1425
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<211>   973
<212>   PRT
<213>   Serratia entomophila

<400>   6
Met Ser Thr Ser Leu Phe Ser Ser Thr Pro Ser Val Ala Val Leu Asp
1               5                   10                  15
Asn Arg Gly Leu Leu Val Arg Glu Leu Gln Tyr Tyr Arg His Pro Asp
              20                  25                  30
Thr Pro Glu Glu Thr Asp Glu Arg Ile Thr Cys His Gln His Asp Glu
          35                  40                  45
Arg Gly Ser Leu Ser Gln Ser Ala Asp Pro Arg Leu His Ala Ala Gly
      50                  55                  60
Leu Thr Asn Phe Thr Tyr Leu Asn Ser Leu Thr Gly Thr Val Leu Gln
65                  70                  75                  80
Ser Val Ser Ala Asp Ala Gly Thr Ser Leu Glu Leu Ser Asp Ala Ala
                  85                  90                  95
Gly Arg Ala Phe Leu Ala Val Thr Gly Ala Gly Thr Glu Asp Ala Val
              100                 105                 110
Thr Arg Thr Trp Gln Tyr Glu Asp Asp Thr Leu Pro Gly Arg Pro Leu
          115                 120                 125
Ser Ile Thr Glu Gln Val Thr Gly Glu Ala Ala Gln Ile Thr Glu Arg
          130                 135                 140
Phe Val Tyr Ala Gly Asn Thr Asp Ala Glu Lys Ile Leu Asn Leu Ala
145                 150                 155                 160
Gly Gln Cys Val Ser His Tyr Asp Thr Ala Gly Leu Val Gln Thr Asp
                  165                 170                 175
Ser Ile Ala Leu Ser Gly Val Pro Leu Ala Val Thr Arg Gln Leu Leu
              180                 185                 190
Pro Asp Ala Ala Gly Ala Asn Trp Met Gly Glu Asp Ala Ser Ala Trp
          195                 200                 205
Asn Asp Leu Leu Asp Gly Glu Thr Phe Phe Thr Gln Thr His Ala Asp
      210                 215                 220
Ala Thr Gly Ala Val Leu Ser Ile Thr Asp Ala Lys Gly Asn Leu Gln
225                 230                 235                 240
Arg Val Ala Tyr Asp Val Ala Gly Leu Leu Ser Gly Ser Trp Leu Thr
                  245                 250                 255
Leu Lys Asp Gly Thr Glu Gln Val Ile Val Ala Ser Leu Thr Tyr Ser
              260                 265                 270
Ala Ala Gly Lys Lys Leu Arg Glu Glu His Gly Asn Gly Val Val Thr
          275                 280                 285
Ser Tyr Ile Tyr Glu Pro Glu Thr Gln Arg Leu Thr Gly Ile Lys Thr
      290                 295                 300
Glu Arg Pro Ser Gly His Val Ala Gly Ala Lys Val Leu Gln Asp Leu
305                 310                 315                 320
Arg Tyr Thr Tyr Asp Pro Val Gly Asn Val Leu Ser Val Asn Asn Asp
                  325                 330                 335
Ala Glu Glu Thr Arg Phe Trp Arg Asn Gln Lys Val Val Pro Glu Asn
              340                 345                 350
Thr Tyr Ile Tyr Asp Ser Leu Tyr Gln Leu Val Ser Ala Thr Gly Arg
          355                 360                 365
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Glu Met Ala Asn Ala Gly Gln Gln Gly Asn Asp Leu Pro Ser Ala Thr
370   375   380
Ala Pro Leu Pro Thr Asp Ser Ser Ala Tyr Thr Asn Tyr Thr Arg Thr
385   390   395   400
Tyr Arg Tyr Asp Arg Gly Gly Asn Leu Thr Gln Met Arg His Ser Ala
            405   410   415
Pro Ala Thr Asn Asn Asn Tyr Thr Thr Asp Ile Thr Val Ser Asp Arg
            420   425   430
Ser Asn Arg Ala Val Leu Ser Thr Leu Ala Glu Val Pro Ser Asp Val
            435   440   445
Asp Met Leu Phe Ser Ala Gly Gly His Gln Lys His Leu Gln Pro Gly
450   455   460
Gln Ala Leu Val Trp Thr Pro Arg Gly Glu Leu Gln Lys Val Thr Pro
465   470   475   480
Val Val Arg Asp Gly Gly Ala Asp Asp Ser Glu Ser Tyr Arg Tyr Asp
            485   490   495
Ala Gly Ser Gln Arg Ile Ile Lys Thr Gly Thr Arg Gln Thr Gly Asn
            500   505   510
Asn Val Gln Thr Gln Arg Val Val Tyr Leu Pro Gly Leu Glu Leu Arg
            515   520   525
Ile Met Ala Asn Gly Val Thr Glu Lys Glu Ser Leu Gln Val Ile Thr
530   535   540
Val Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu His Trp Glu Ile
545   550   555   560
Gly Lys Pro Asp Asp Leu Asp Glu Asp Ser Val Arg Tyr Ser Tyr Asp
            565   570   575
Asn Leu Val Gly Ser Ser Gln Leu Glu Leu Asp Arg Glu Gly Tyr Leu
            580   585   590
Ile Ser Glu Glu Glu Phe Tyr Pro Tyr Gly Gly Thr Ala Val Leu Thr
            595   600   605
Ala Arg Ser Glu Val Glu Ala Asp Tyr Lys Thr Ile Arg Tyr Ser Gly
610   615   620
Lys Glu Arg Asp Ala Thr Gly Leu Asp Tyr Tyr Gly Tyr Arg Tyr Tyr
625   630   635   640
Gln Pro Trp Ala Gly Arg Trp Leu Ser Thr Asp Pro Ala Gly Thr Val
            645   650   655
Asp Gly Leu Asn Leu Phe Arg Met Val Arg Asn Asn Pro Val Thr Leu
            660   665   670
Phe Asp Ser Asn Gly Arg Ile Ser Thr Gly Gln Glu Ala Arg Arg Leu
            675   680   685
Val Gly Glu Ala Phe Val His Pro Leu His Met Pro Val Phe Glu Arg
690   695   700
Ile Ser Val Glu Arg Lys Ile Ser Met Ser Val Arg Glu Ala Gly Ile
705   710   715   720
Tyr Thr Ile Ser Ala Leu Gly Glu Gly Ala Ala Ala Lys Gly His Asn
            725   730   735
Ile Leu Glu Lys Thr Ile Lys Pro Gly Ser Leu Lys Ala Ile Tyr Gly
            740   745   750
Asp Lys Ala Glu Ser Ile Leu Gly Leu Ala Lys Arg Ser Gly Leu Val
            755   760   765
Gly Arg Val Gly Gln Trp Asp Ala Ser Gly Val Arg Gly Ile Tyr Ala
770   775   780
His Asn Arg Pro Gly Gly Glu Asp Leu Val Tyr Pro Val Ser Leu Gln
785   790   795   800
Asn Thr Ser Ala Asn Glu Ile Val Asn Ala Trp Ile Lys Phe Lys Ile
            805   810   815
Ile Thr Pro Tyr Thr Gly Asp Tyr Asp Met His Asp Ile Ile Lys Phe
            820   825   830
Ser Asp Gly Lys Gly His Val Pro Thr Ala Glu Ser Ser Glu Glu Arg
            835   840   845
Gly Val Lys Asp Leu Ile Asn Lys Gly Val Ala Glu Val Asp Pro Ser
850   855   860
Arg Pro Phe Glu Tyr Thr Ala Met Asn Val Ile Arg His Gly Pro Gln

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         865                  870                  875                  880
Val Asn Phe Val Pro Tyr Met Trp Glu His Glu His Asp Lys Val Val
                         885                  890                  895
Asn Asp Asn Gly Tyr Leu Gly Val Val Ala Ser Pro Gly Pro Phe Pro
            900                  905                  910
Val Ala Met Val His Gln Gly Glu Trp Thr Val Phe Asp Asn Ser Glu
         915                  920                  925
Glu Leu Phe Asn Phe Tyr Lys Ser Thr Asn Thr Pro Leu Pro Glu His
         930                  935                  940
Trp Ser Gln Asp Phe Met Asp Arg Gly Lys Gly Ile Val Ala Thr Pro
945                  950                  955                  960
Arg His Ala Glu Leu Leu Asp Lys Arg Arg Val Met Tyr
                  965                  970
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<211> 2516
<212> PRT
<213> Photorhabdus luminescens

<400> 7

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Met Asn Glu Ser Val Lys Glu Ile Pro Asp Val Leu Lys Ser Gln Cys
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Gly Phe Asn Cys Leu Thr Asp Ile Ser His Ser Ser Phe Asn Glu Phe
            20                 25                 30
Arg Gln Gln Val Ser Glu His Leu Ser Trp Ser Glu Thr His Asp Leu
         35                  40                 45
Tyr His Asp Ala Gln Gln Ala Gln Lys Asp Asn Arg Leu Tyr Glu Ala
      50                 55                  60
Arg Ile Leu Lys Arg Ala Asn Pro Gln Leu Gln Asn Ala Val His Leu
65                 70                  75                 80
Ala Ile Leu Ala Pro Asn Ala Glu Leu Ile Gly Tyr Asn Asn Gln Phe
                  85                 90                  95
Ser Gly Arg Ala Ser Gln Tyr Val Ala Pro Gly Thr Val Ser Ser Met
            100                105                 110
Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Arg Asn
         115                120                 125
Leu His Ala Ser Asp Ser Val Tyr Tyr Leu Asp Thr Arg Arg Pro Asp
      130                135                 140
Leu Lys Ser Met Ala Leu Ser Gln Gln Asn Met Asp Ile Glu Leu Ser
145                150                 155                 160
Thr Leu Ser Leu Ser Asn Glu Leu Leu Leu Glu Ser Ile Lys Thr Glu
                  165                170                 175
Ser Lys Leu Glu Asn Tyr Thr Lys Val Met Glu Met Leu Ser Thr Phe
            180                185                 190
Arg Pro Ser Gly Ala Thr Pro Tyr His Asp Ala Tyr Glu Asn Val Arg
         195                200                 205
Glu Val Ile Gln Leu Gln Asp Pro Gly Leu Glu Gln Leu Asn Ala Ser
      210                215                 220
Pro Ala Ile Ala Gly Leu Met His Gln Ala Ser Leu Leu Gly Ile Asn
225                230                 235                 240
Ala Ser Ile Ser Pro Glu Leu Phe Asn Ile Leu Thr Glu Glu Ile Thr
                  245                250                 255
Glu Gly Asn Ala Glu Glu Leu Tyr Lys Lys Asn Phe Gly Asn Ile Glu
            260                265                 270
Pro Ala Ser Leu Ala Met Pro Glu Tyr Leu Lys Arg Tyr Tyr Asn Leu
         275                280                 285
Ser Asp Glu Glu Leu Ser Gln Phe Ile Gly Lys Ala Ser Asn Phe Gly
      290                295                 300
Gln Glu Tyr Ser Asn Asn Gln Leu Ile Thr Pro Val Val Asn Ser
305                310                 315                 320
Ser Asp Gly Thr Val Lys Val Tyr Arg Ile Thr Arg Glu Tyr Thr Thr
            325                330                 335
```

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Asn Ala Tyr Gln Met Asp Val Glu Leu Phe Pro Phe Gly Gly Glu Asn
              340   345   350
Tyr Arg Leu Asp Tyr Lys Phe Lys Asn Phe Tyr Asn Ala Ser Tyr Leu
          355   360   365
Ser Ile Lys Leu Asn Asp Lys Arg Glu Leu Val Arg Thr Glu Gly Ala
      370   375   380
Pro Gln Val Asn Ile Glu Tyr Ser Ala Asn Ile Thr Leu Asn Thr Ala
385   390   395   400
Asp Ile Ser Gln Pro Phe Glu Ile Gly Leu Thr Arg Val Leu Pro Ser
              405   410   415
Gly Ser Trp Ala Tyr Ala Ala Ala Lys Phe Thr Val Glu Glu Tyr Asn
              420   425   430
Gln Tyr Ser Phe Leu Leu Lys Leu Asn Lys Ala Ile Arg Leu Ser Arg
          435   440   445
Ala Thr Glu Leu Ser Pro Thr Ile Leu Glu Gly Ile Val Arg Ser Val
      450   455   460
Asn Leu Gln Leu Asp Ile Asn Thr Asp Val Leu Gly Lys Val Phe Leu
465   470   475   480
Thr Lys Tyr Tyr Met Gln Arg Tyr Ala Ile His Ala Glu Thr Ala Leu
              485   490   495
Ile Leu Cys Asn Ala Pro Ile Ser Gln Arg Ser Tyr Asp Asn Gln Pro
              500   505   510
Ser Gln Phe Asp Arg Leu Phe Asn Thr Pro Leu Leu Asn Gly Gln Tyr
          515   520   525
Phe Ser Thr Gly Asp Glu Glu Ile Asp Leu Asn Ser Gly Ser Thr Gly
          530   535   540
Asp Trp Arg Lys Thr Ile Leu Lys Arg Ala Phe Asn Ile Asp Asp Val
545   550   555   560
Ser Leu Phe Arg Leu Leu Lys Ile Thr Asp His Asp Asn Lys Asp Gly
              565   570   575
Lys Ile Lys Asn Asn Leu Lys Asn Leu Ser Asn Leu Tyr Ile Gly Lys
              580   585   590
Leu Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Asp Leu Leu
          595   600   605
Leu Ile Ala Val Gly Glu Gly Lys Thr Asn Leu Ser Ala Ile Ser Asp
      610   615   620
Lys Gln Leu Ala Thr Leu Ile Arg Lys Leu Asn Thr Ile Thr Ser Trp
625   630   635   640
Leu His Thr Gln Lys Trp Ser Val Phe Gln Leu Phe Ile Met Thr Ser
              645   650   655
Thr Ser Tyr Asn Lys Thr Leu Thr Pro Glu Ile Lys Asn Leu Leu Asp
              660   665   670
Thr Val Tyr His Gly Leu Gln Gly Phe Asp Lys Asp Lys Ala Asp Leu
          675   680   685
Leu His Val Met Ala Pro Tyr Ile Ala Ala Thr Leu Gln Leu Ser Ser
          690   695   700
Glu Asn Val Ala His Ser Val Leu Leu Trp Ala Asp Lys Leu Gln Pro
705   710   715   720
Gly Asp Gly Ala Met Thr Ala Glu Lys Phe Trp Asp Trp Leu Asn Thr
              725   730   735
Lys Tyr Thr Pro Gly Ser Ser Glu Ala Val Glu Thr Gln Glu His Ile
              740   745   750
Val Gln Tyr Cys Gln Ala Leu Ala Gln Leu Glu Met Val Tyr His Ser
          755   760   765
Thr Gly Ile Asn Glu Asn Ala Phe Arg Leu Phe Val Thr Lys Pro Glu
          770   775   780
Met Phe Gly Ala Ala Thr Gly Ala Ala Pro Ala His Asp Ala Leu Ser
785   790   795   800
Leu Ile Met Leu Thr Arg Phe Ala Asp Trp Val Asn Ala Leu Gly Glu
              805   810   815
Lys Ala Ser Ser Val Leu Ala Ala Phe Glu Ala Asn Ser Leu Thr Ala
              820   825   830
Glu Gln Leu Ala Asp Ala Met Asn Leu Asp Ala Asn Leu Leu Leu Gln

```
                   835                        840                        845
Ala Ser Ile Gln Ala Gln Asn His Gln His Leu Pro Pro Val Thr Pro
         850                        855                        860
Glu Asn Ala Phe Ser Cys Trp Thr Ser Ile Asn Thr Ile Leu Gln Trp
865                        870                        875                        880
Val Asn Val Ala Gln Gln Leu Asn Val Ala Pro Gln Gly Val Ser Ala
                   885                        890                        895
Leu Val Gly Leu Asp Tyr Ile Gln Ser Met Lys Glu Thr Pro Thr Tyr
              900                        905                        910
Ala Gln Trp Glu Asn Ala Ala Gly Val Leu Thr Ala Gly Leu Asn Ser
         915                        920                        925
Gln Gln Ala Asn Thr Leu His Ala Phe Leu Asp Glu Ser Arg Ser Ala
    930                        935                        940
Ala Leu Ser Thr Tyr Tyr Ile Arg Gln Val Ala Lys Ala Ala Ala Ala
945                        950                        955                        960
Ile Lys Ser Arg Asp Asp Leu Tyr Gln Tyr Leu Leu Ile Asp Asn Gln
                   965                        970                        975
Val Ser Ala Ala Ile Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Ser
              980                        985                        990
Ile Gln Leu Tyr Val Asn Arg Ala Leu Glu Asn Val Glu Glu Asn Ala
         995                        1000                       1005
Asn Ser Gly Val Ile Ser Arg Gln Phe Phe Ile Asp Trp Asp Lys Tyr
    1010                       1015                       1020
Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Gln Leu Val Tyr Tyr
1025                       1030                       1035                       1040
Pro Glu Asn Tyr Ile Asp Pro Thr Met Arg Ile Gly Gln Thr Lys Met
                   1045                       1050                       1055
Met Asp Ala Leu Leu Gln Ser Val Ser Gln Ser Gln Leu Asn Ala Asp
              1060                       1065                       1070
Thr Val Glu Asp Ala Phe Met Ser Tyr Leu Thr Ser Phe Glu Gln Val
         1075                       1080                       1085
Ala Asn Leu Lys Val Ile Ser Ala Tyr His Asp Asn Ile Asn Asn Asp
    1090                       1095                       1100
Gln Gly Leu Thr Tyr Phe Ile Gly Leu Ser Glu Thr Asp Ala Gly Glu
1105                       1110                       1115                       1120
Tyr Tyr Trp Arg Ser Val Asp His Ser Lys Phe Asn Asp Gly Lys Phe
                   1125                       1130                       1135
Ala Ala Asn Ala Trp Ser Glu Trp His Lys Ile Asp Cys Pro Ile Asn
              1140                       1145                       1150
Pro Tyr Lys Ser Thr Ile Arg Pro Val Ile Tyr Lys Ser Arg Leu Tyr
         1155                       1160                       1165
Leu Leu Trp Leu Glu Gln Lys Glu Ile Thr Lys Gln Thr Gly Asn Ser
    1170                       1175                       1180
Lys Asp Gly Tyr Gln Thr Glu Thr Asp Tyr Arg Tyr Glu Leu Lys Leu
1185                       1190                       1195                       1200
Ala His Ile Arg Tyr Asp Gly Thr Trp Asn Thr Pro Ile Thr Phe Asp
                   1205                       1210                       1215
Val Asn Lys Lys Ile Ser Glu Leu Lys Leu Glu Lys Asn Arg Ala Pro
              1220                       1225                       1230
Gly Leu Tyr Cys Ala Gly Tyr Gln Gly Glu Asp Thr Leu Leu Val Met
         1235                       1240                       1245
Phe Tyr Asn Gln Gln Asp Thr Leu Asp Ser Tyr Lys Asn Ala Ser Met
    1250                       1255                       1260
Gln Gly Leu Tyr Ile Phe Ala Asp Met Ala Ser Lys Asp Met Thr Pro
1265                       1270                       1275                       1280
Glu Gln Ser Asn Val Tyr Arg Asp Asn Ser Tyr Gln Gln Phe Asp Thr
                   1285                       1290                       1295
Asn Asn Val Arg Arg Val Asn Asn Arg Tyr Ala Glu Asp Tyr Glu Ile
              1300                       1305                       1310
Pro Ser Ser Val Ser Ser Arg Lys Asp Tyr Gly Trp Gly Asp Tyr Tyr
         1315                       1320                       1325
Leu Ser Met Val Tyr Asn Gly Asp Ile Pro Thr Ile Asn Tyr Lys Ala
    1330                       1335                       1340
```

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Ala Ser Ser Asp Leu Lys Ile Tyr Ile Ser Pro Lys Leu Arg Ile Ile
1345   1350   1355   1360
His Asn Gly Tyr Glu Gly Gln Lys Arg Asn Gln Cys Asn Leu Met Asn
                1365   1370   1375
Lys Tyr Gly Lys Leu Gly Asp Lys Phe Ile Val Tyr Thr Ser Leu Gly
                1380   1385   1390
Val Asn Pro Asn Asn Ser Ser Asn Lys Leu Met Phe Tyr Pro Val Tyr
                1395   1400   1405
Gln Tyr Ser Gly Asn Thr Ser Gly Leu Asn Gln Gly Arg Leu Leu Phe
        1410   1415   1420
His Arg Asp Thr Thr Tyr Pro Ser Lys Val Glu Ala Trp Ile Pro Gly
1425   1430   1435   1440
Ala Lys Arg Ser Leu Thr Asn Gln Asn Ala Ala Ile Gly Asp Asp Tyr
                1445   1450   1455
Ala Thr Asp Ser Leu Asn Lys Pro Asp Asp Leu Lys Gln Tyr Ile Phe
                1460   1465   1470
Met Thr Asp Ser Lys Gly Thr Ala Thr Asp Val Ser Gly Pro Val Glu
                1475   1480   1485
Ile Asn Thr Ala Ile Ser Pro Ala Lys Val Gln Ile Ile Val Lys Ala
        1490   1495   1500
Gly Gly Lys Glu Gln Thr Phe Thr Ala Asp Lys Asp Val Ser Ile Gln
1505   1510   1515   1520
Pro Ser Pro Ser Phe Asp Glu Met Asn Tyr Gln Phe Asn Ala Leu Glu
                1525   1530   1535
Ile Asp Gly Ser Gly Leu Asn Phe Ile Asn Asn Ser Ala Ser Ile Asp
                1540   1545   1550
Val Thr Phe Thr Ala Phe Ala Glu Asp Gly Arg Lys Leu Gly Tyr Glu
                1555   1560   1565
Ser Phe Ser Ile Pro Val Thr Leu Lys Val Ser Thr Asp Asn Ala Leu
        1570   1575   1580
Thr Leu His His Asn Glu Asn Gly Ala Gln Tyr Met Gln Trp Gln Ser
1585   1590   1595   1600
Tyr Arg Thr Arg Leu Asn Thr Leu Phe Ala Arg Gln Leu Val Ala Arg
                1605   1610   1615
Ala Thr Thr Gly Ile Asp Thr Ile Leu Ser Met Glu Thr Gln Asn Ile
                1620   1625   1630
Gln Glu Pro Gln Leu Gly Lys Gly Phe Tyr Ala Thr Phe Val Ile Pro
                1635   1640   1645
Pro Tyr Asn Leu Ser Thr His Gly Asp Glu Arg Trp Phe Lys Leu Tyr
        1650   1655   1660
Ile Lys His Val Val Asp Asn Asn Ser His Ile Ile Tyr Ser Gly Gln
1665   1670   1675   1680
Leu Thr Asp Thr Asn Ile Asn Ile Thr Leu Phe Ile Pro Leu Asp Asp
                1685   1690   1695
Val Pro Leu Asn Gln Asp Tyr His Ala Lys Val Tyr Met Thr Phe Lys
                1700   1705   1710
Lys Ser Pro Ser Asp Gly Thr Trp Trp Gly Pro His Phe Val Arg Asp
        1715   1720   1725
Asp Lys Gly Ile Val Thr Ile Asn Pro Lys Ser Ile Leu Thr His Phe
        1730   1735   1740
Glu Ser Val Asn Val Leu Asn Asn Ile Ser Ser Glu Pro Met Asp Phe
1745   1750   1755   1760
Ser Gly Ala Asn Ser Leu Tyr Phe Trp Glu Leu Phe Tyr Tyr Thr Pro
                1765   1770   1775
Met Leu Val Ala Gln Arg Leu Leu His Glu Gln Asn Phe Asp Glu Ala
                1780   1785   1790
Asn Arg Trp Leu Lys Tyr Val Trp Ser Pro Ser Gly Tyr Ile Val His
        1795   1800   1805
Gly Gln Ile Gln Asn Tyr Gln Trp Asn Val Arg Pro Leu Leu Glu Asp
        1810   1815   1820
Thr Ser Trp Asn Ser Asp Pro Leu Asp Ser Val Asp Pro Asp Ala Val
1825   1830   1835   1840
Ala Gln His Asp Pro Met His Tyr Lys Val Ser Thr Phe Met Arg Thr

```
                1845                   1850                    1855
Leu Asp Leu Leu Ile Ala Arg Gly Asp His Ala Tyr Arg Gln Leu Glu
                1860                   1865                    1870
Arg Asp Thr Leu Asn Glu Ala Lys Met Trp Tyr Met Gln Ala Leu His
           1875                   1880                   1885
Leu Leu Gly Asp Lys Pro Tyr Leu Pro Leu Ser Thr Thr Trp Ser Asp
           1890                   1895                   1900
Pro Arg Leu Asp Arg Ala Ala Asp Ile Thr Thr Gln Asn Ala His Asp
      1905                   1910                   1915                   1920
Ser Ala Ile Val Ala Leu Arg Gln Asn Ile Pro Thr Pro Ala Pro Leu
                1925                   1930                    1935
Ser Leu Arg Ser Ala Asn Thr Leu Thr Asp Leu Phe Leu Pro Gln Ile
                1940                   1945                    1950
Asn Glu Val Met Met Asn Tyr Trp Gln Thr Leu Ala Gln Arg Val Tyr
           1955                   1960                   1965
Asn Leu Arg His Asn Leu Ser Ile Asp Gly Gln Pro Leu Tyr Leu Pro
           1970                   1975                   1980
Ile Tyr Ala Thr Pro Ala Asp Pro Lys Ala Leu Leu Ser Ala Ala Val
      1985                   1990                   1995                   2000
Ala Thr Ser Gln Gly Gly Gly Lys Leu Pro Glu Ser Phe Met Ser Leu
                2005                   2010                    2015
Trp Arg Phe Pro His Met Leu Glu Asn Ala Arg Gly Met Val Ser Gln
                2020                   2025                    2030
Leu Thr Gln Phe Gly Ser Thr Leu Gln Asn Ile Ile Glu Arg Gln Asp
           2035                   2040                   2045
Ala Glu Ala Leu Asn Ala Leu Leu Gln Asn Gln Ala Ala Glu Leu Ile
      2050                   2055                   2060
Leu Thr Asn Leu Ser Ile Gln Asp Lys Thr Ile Glu Glu Leu Asp Ala
      2065                   2070                   2075                   2080
Glu Lys Thr Val Leu Glu Lys Ser Lys Ala Gly Ala Gln Ser Arg Phe
                2085                   2090                    2095
Asp Ser Tyr Gly Lys Leu Tyr Asp Glu Asn Ile Asn Ala Gly Glu Asn
           2100                   2105                   2110
Gln Ala Met Thr Leu Arg Ala Ser Ala Ala Gly Leu Thr Thr Ala Val
           2115                   2120                   2125
Gln Ala Ser Arg Leu Ala Gly Ala Ala Ala Asp Leu Val Pro Asn Ile
      2130                   2135                   2140
Phe Gly Phe Ala Gly Gly Gly Ser Arg Trp Gly Ala Ile Ala Glu Ala
      2145                   2150                   2155                   2160
Thr Gly Tyr Val Met Glu Phe Ser Ala Asn Val Met Asn Thr Glu Ala
                2165                   2170                    2175
Asp Lys Ile Ser Gln Ser Glu Thr Tyr Arg Arg Arg Arg Gln Glu Trp
                2180                   2185                    2190
Glu Ile Gln Arg Asn Asn Ala Glu Ala Glu Leu Lys Gln Ile Asp Ala
           2195                   2200                   2205
Gln Leu Lys Ser Leu Ala Val Arg Arg Glu Ala Ala Val Leu Gln Lys
      2210                   2215                   2220
Thr Ser Leu Lys Thr Gln Gln Glu Gln Thr Gln Ser Gln Leu Ala Phe
      2225                   2230                   2235                   2240
Leu Gln Arg Lys Phe Ser Asn Gln Ala Leu Tyr Asn Trp Leu Arg Gly
                2245                   2250                    2255
Arg Leu Ala Ala Ile Tyr Phe Gln Phe Tyr Asp Leu Ala Val Ala Arg
           2260                   2265                   2270
Cys Leu Met Ala Glu Gln Ala Tyr Arg Trp Glu Leu Asn Asp Asp Ser
           2275                   2280                   2285
Ala Arg Phe Ile Lys Pro Gly Ala Trp Gln Gly Thr Tyr Ala Gly Leu
      2290                   2295                   2300
Leu Ala Gly Glu Thr Leu Met Leu Ser Leu Ala Gln Met Glu Asp Ala
      2305                   2310                   2315                   2320
His Leu Lys Arg Asp Lys Arg Ala Leu Glu Val Glu Arg Thr Val Ser
                2325                   2330                    2335
Leu Ala Glu Val Tyr Ala Gly Leu Pro Lys Asp Asn Gly Pro Phe Ser
           2340                   2345                   2350
```

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```
Leu Ala Gln Glu Ile Asp Lys Leu Val Ser Gln Gly Ser Gly Ser Ala
        2355            2360            2365
Gly Ser Gly Asn Asn Asn Leu Ala Phe Gly Ala Gly Thr Asp Thr Lys
        2370            2375            2380
Thr Ser Leu Gln Ala Ser Val Ser Phe Ala Asp Leu Lys Ile Arg Glu
2385            2390            2395            2400
Asp Tyr Pro Ala Ser Leu Gly Lys Ile Arg Arg Ile Lys Gln Ile Ser
        2405            2410            2415
Val Thr Leu Pro Ala Leu Leu Gly Pro Tyr Gln Asp Val Gln Ala Ile
        2420            2425            2430
Leu Ser Tyr Gly Asp Lys Ala Gly Leu Ala Asn Gly Cys Glu Ala Leu
        2435            2440            2445
Ala Val Ser His Gly Met Asn Asp Ser Gly Gln Phe Gln Leu Asp Phe
        2450            2455            2460
Asn Asp Gly Lys Phe Leu Pro Phe Glu Gly Ile Ala Ile Asp Gln Gly
2465            2470            2475            2480
Thr Leu Thr Leu Ser Phe Pro Asn Ala Ser Met Pro Glu Lys Gly Lys
        2485            2490            2495
Gln Ala Thr Met Leu Lys Thr Leu Asn Asp Ile Ile Leu His Ile Arg
        2500            2505            2510
Tyr Thr Ile Lys
        2515
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<211> 1189
<212> PRT
<213> Photorhabdus luminescens

<400> 8

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Met Ser Glu Ser Leu Phe Thr Gln Thr Leu Lys Glu Ala Arg Arg Asp
 1           5               10              15
Ala Leu Val Ala His Tyr Ile Ala Thr Gln Val Pro Ala Asp Leu Lys
        20              25              30
Glu Ser Ile Gln Thr Ala Asp Asp Leu Tyr Glu Tyr Leu Leu Leu Asp
        35              40              45
Thr Lys Ile Ser Asp Leu Val Thr Thr Ser Pro Leu Ser Glu Ala Ile
        50              55              60
Gly Ser Leu Gln Leu Phe Ile His Arg Ala Ile Glu Gly Tyr Asp Gly
65              70              75              80
Thr Leu Ala Asp Ser Ala Lys Pro Tyr Phe Ala Asp Glu Gln Phe Leu
                85              90              95
Tyr Asn Trp Asp Ser Phe Asn His Arg Tyr Ser Thr Trp Ala Gly Lys
                100             105             110
Glu Arg Leu Lys Phe Tyr Ala Gly Asp Tyr Ile Asp Pro Thr Leu Arg
        115             120             125
Leu Asn Lys Thr Glu Ile Phe Thr Ala Phe Glu Gln Gly Ile Ser Gln
        130             135             140
Gly Lys Leu Lys Ser Glu Leu Val Glu Ser Lys Leu Arg Asp Tyr Leu
145             150             155             160
Ile Ser Tyr Asp Thr Leu Ala Thr Leu Asp Tyr Ile Thr Ala Cys Gln
                165             170             175
Gly Lys Asp Asn Lys Thr Ile Phe Phe Ile Gly Arg Thr Gln Asn Ala
        180             185             190
Pro Tyr Ala Phe Tyr Trp Arg Lys Leu Thr Leu Val Thr Asp Gly Gly
        195             200             205
Lys Leu Lys Pro Asp Gln Trp Ser Glu Trp Arg Ala Ile Asn Ala Gly
        210             215             220
Ile Ser Glu Ala Tyr Ser Gly His Val Glu Pro Phe Trp Glu Asn Asn
225             230             235             240
Lys Leu His Ile Arg Trp Phe Thr Ile Ser Lys Glu Asp Lys Ile Asp
                245             250             255
Phe Val Tyr Lys Asn Ile Trp Val Met Ser Ser Asp Tyr Ser Trp Ala
```

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            260                    265                    270
Ser Lys Lys Lys Ile Leu Glu Leu Ser Phe Thr Asp Tyr Asn Arg Val
            275                    280                    285
Gly Ala Thr Gly Ser Ser Ser Pro Thr Glu Val Ala Ser Gln Tyr Gly
   290                    295                    300
Ser Asp Ala Gln Met Asn Ile Ser Asp Asp Gly Thr Val Leu Ile Phe
305                    310                    315                    320
Gln Asn Ala Gly Gly Ala Thr Pro Ser Thr Gly Val Thr Leu Cys Tyr
            325                    330                    335
Asp Ser Gly Asn Val Ile Lys Asn Leu Ser Ser Thr Gly Ser Ala Asn
            340                    345                    350
Leu Ser Ser Lys Asp Tyr Ala Thr Thr Lys Leu Arg Met Cys His Gly
            355                    360                    365
Gln Ser Tyr Asn Asp Asn Asn Tyr Cys Asn Phe Thr Leu Ser Ile Asn
   370                    375                    380
Thr Ile Glu Phe Thr Ser Tyr Gly Thr Phe Ser Ser Asp Gly Lys Gln
385                    390                    395                    400
Phe Thr Pro Pro Ser Gly Ser Ala Ile Asp Leu His Leu Pro Asn Tyr
            405                    410                    415
Val Asp Leu Asn Ala Leu Leu Asp Ile Ser Leu Asp Ser Leu Leu Asn
            420                    425                    430
Tyr Asp Val Gln Gly Gln Phe Gly Gly Ser Asn Pro Val Asp Asn Phe
            435                    440                    445
Ser Gly Pro Tyr Gly Ile Tyr Leu Trp Glu Ile Phe Phe His Ile Pro
   450                    455                    460
Phe Leu Val Thr Val Arg Met Gln Thr Glu Gln Arg Tyr Glu Asp Ala
465                    470                    475                    480
Asp Thr Trp Tyr Lys Tyr Ile Phe Arg Ser Ala Gly Tyr Arg Asp Ala
            485                    490                    495
Asn Gly Gln Leu Ile Met Asp Gly Ser Lys Pro Arg Tyr Trp Asn Val
            500                    505                    510
Met Pro Leu Gln Leu Asp Thr Ala Trp Asp Thr Thr Gln Pro Ala Thr
            515                    520                    525
Thr Asp Pro Asp Val Ile Ala Met Ala Asp Pro Met His Tyr Lys Leu
   530                    535                    540
Ala Ile Phe Leu His Thr Leu Asp Leu Leu Ile Ala Arg Gly Asp Ser
545                    550                    555                    560
Ala Tyr Arg Gln Leu Glu Arg Asp Thr Leu Val Glu Ala Lys Met Tyr
            565                    570                    575
Tyr Ile Gln Ala Gln Gln Leu Leu Gly Pro Arg Pro Asp Ile His Thr
            580                    585                    590
Thr Asn Thr Trp Pro Asn Pro Thr Leu Ser Lys Glu Ala Gly Ala Ile
   595                    600                    605
Ala Thr Pro Thr Phe Leu Ser Ser Pro Glu Val Met Thr Phe Ala Ala
   610                    615                    620
Trp Leu Ser Ala Gly Asp Thr Ala Asn Ile Gly Asp Gly Asp Phe Leu
625                    630                    635                    640
Pro Pro Tyr Asn Asp Val Leu Leu Gly Tyr Trp Asp Lys Leu Glu Leu
            645                    650                    655
Arg Leu Tyr Asn Leu Arg His Asn Leu Ser Leu Asp Gly Gln Pro Leu
            660                    665                    670
Asn Leu Pro Leu Tyr Ala Thr Pro Val Asp Pro Lys Thr Leu Gln Arg
   675                    680                    685
Gln Gln Ala Gly Gly Asp Gly Thr Gly Ser Ser Pro Ala Gly Gly Gln
   690                    695                    700
Gly Ser Val Gln Gly Trp Arg Tyr Pro Leu Leu Val Glu Arg Ala Arg
705                    710                    715                    720
Ser Ala Val Ser Leu Leu Thr Gln Phe Gly Asn Ser Leu Gln Thr Thr
            725                    730                    735
Leu Glu His Gln Asp Asn Glu Lys Met Thr Leu Leu Leu Gln Thr Gln
            740                    745                    750
Gln Gln Ala Ile Leu Lys Gln Gln His Asp Ile Gln Gln Asn Asn Leu
   755                    760                    765
```

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```
Lys Gly Leu Gln His Ser Leu Thr Ala Leu Gln Ala Ser Arg Asp Gly
    770                 775                 780
Ala Thr Leu Arg Gln Lys His Tyr Ser Asp Leu Ile Asn Gly Gly Leu
785                 790                 795                 800
Ser Ala Ala Glu Ile Ala Gly Leu Thr Leu Arg Ser Thr Ala Met Ile
                805                 810                 815
Thr Asn Gly Val Ala Thr Gly Leu Leu Ile Ala Gly Gly Ile Ala Asn
        820                 825                 830
Ala Val Pro Asn Val Phe Gly Leu Ala Asn Gly Gly Ser Glu Trp Gly
        835                 840                 845
Ala Pro Leu Ile Gly Ser Gly Gln Ala Thr Gln Val Gly Ala Gly Ile
    850                 855                 860
Gln Asp Gln Ser Ala Gly Ile Ser Glu Val Thr Ala Gly Tyr Gln Arg
865                 870                 875                 880
Arg Gln Glu Glu Trp Ala Leu Gln Arg Asp Ile Ala Asp Asn Glu Ile
                885                 890                 895
Thr Gln Leu Asp Ala Gln Ile Gln Ser Leu Gln Glu Gln Ile Thr Met
                900                 905                 910
Ala Gln Lys Gln Ile Thr Leu Ser Glu Thr Glu Gln Ala Asn Ala Gln
        915                 920                 925
Ala Ile Tyr Asp Leu Gln Thr Thr Arg Phe Thr Gly Gln Ala Leu Tyr
    930                 935                 940
Asn Trp Met Ala Gly Arg Leu Ser Ala Leu Tyr Tyr Gln Met Tyr Asp
945                 950                 955                 960
Ser Thr Leu Pro Ile Cys Leu Gln Ala Lys Ala Ala Leu Val Gln Glu
                965                 970                 975
Leu Gly Glu Lys Glu Ser Asp Ser Leu Phe Gln Val Pro Val Trp Asn
            980                 985                 990
Asp Leu Trp Gln Gly Leu Leu Ala Gly Glu Gly Leu Ser Ser Glu Leu
    995                 1000                1005
Gln Lys Leu Asp Ala Ile Trp Leu Ala Arg Gly Gly Ile Gly Leu Glu
    1010                1015                1020
Ala Ile Arg Thr Val Ser Leu Asp Thr Leu Phe Gly Thr Gly Thr Leu
1025                1030                1035                1040
Ser Glu Asn Ile Asn Lys Val Leu Asn Gly Glu Thr Val Ser Pro Ser
                1045                1050                1055
Gly Gly Val Thr Leu Ala Leu Thr Gly Asp Ile Phe Gln Ala Thr Leu
        1060                1065                1070
Asp Leu Ser Gln Leu Gly Leu Asp Asn Ser Tyr Asn Leu Gly Asn Glu
        1075                1080                1085
Lys Lys Arg Arg Ile Lys Arg Ile Ala Val Thr Leu Pro Thr Leu Leu
    1090                1095                1100
Gly Pro Tyr Gln Asp Leu Glu Ala Thr Leu Val Met Gly Ala Glu Ile
1105                1110                1115                1120
Ala Ala Leu Ser His Gly Val Asn Asp Gly Gly Arg Phe Val Thr Asp
                1125                1130                1135
Phe Asn Asp Ser Arg Phe Leu Pro Phe Glu Gly Arg Asp Ala Thr Thr
            1140                1145                1150
Gly Thr Leu Glu Leu Asn Ile Phe His Ala Gly Lys Glu Gly Thr Gln
        1155                1160                1165
His Glu Leu Val Ala Asn Leu Ser Asp Ile Ile Val His Leu Asn Tyr
    1170                1175                1180
Ile Ile Arg Asp Ala
1185
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<212> PRT
<213> Photorhabdus luminescens

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            20                  25                  30
Ile Val Ile Gly Gly Asp Thr Asp Thr Arg Val Thr Arg His Gln Tyr
        35                  40                  45
Asp Ala Arg Gly His Leu Asn Tyr Ser Ile Asp Pro Arg Leu Tyr Asp
    50                  55                  60
Ala Lys Gln Ala Asp Asn Ser Val Lys Pro Asn Phe Val Trp Gln His
65                  70                  75                  80
Asp Leu Ala Gly His Ala Leu Arg Thr Glu Ser Val Asp Ala Gly Arg
                85                  90                  95
Thr Val Ala Leu Asn Asp Ile Glu Gly Arg Ser Val Met Thr Met Asn
            100                 105                 110
Ala Thr Gly Val Arg Gln Thr Arg Arg Tyr Glu Gly Asn Thr Leu Pro
        115                 120                 125
Gly Arg Leu Leu Ser Val Ser Glu Gln Val Phe Asn Gln Glu Ser Ala
    130                 135                 140
Lys Val Thr Glu Arg Phe Ile Trp Ala Gly Asn Thr Thr Ser Glu Lys
145                 150                 155                 160
Glu Tyr Asn Leu Ser Gly Leu Cys Ile Arg His Tyr Asp Thr Ala Gly
                165                 170                 175
Val Thr Arg Leu Met Ser Gln Ser Leu Ala Gly Ala Met Leu Ser Gln
            180                 185                 190
Ser His Gln Leu Leu Ala Glu Gly Gln Glu Ala Asn Trp Ser Gly Asp
        195                 200                 205
Asp Glu Thr Val Trp Gln Gly Met Leu Ala Ser Glu Val Tyr Thr Thr
    210                 215                 220
Gln Ser Thr Thr Asn Ala Ile Gly Ala Leu Leu Thr Gln Thr Asp Ala
225                 230                 235                 240
Lys Gly Asn Ile Gln Arg Leu Ala Tyr Asp Ile Ala Gly Gln Leu Lys
                245                 250                 255
Gly Ser Trp Leu Thr Val Lys Gly Gln Ser Glu Gln Val Ile Val Lys
            260                 265                 270
Ser Leu Ser Trp Ser Ala Ala Gly His Lys Leu Arg Glu Glu His Gly
        275                 280                 285
Asn Gly Val Val Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu
    290                 295                 300
Ile Gly Ile Thr Thr Arg Arg Ala Glu Gly Ser Gln Ser Gly Ala Arg
305                 310                 315                 320
Val Leu Gln Asp Leu Arg Tyr Lys Tyr Asp Pro Val Gly Asn Val Ile
            325                 330                 335
Ser Ile His Asn Asp Ala Glu Ala Thr Arg Phe Trp Arg Asn Gln Lys
        340                 345                 350
Val Glu Pro Glu Asn Arg Tyr Val Tyr Asp Ser Leu Tyr Gln Leu Met
        355                 360                 365
Ser Ala Thr Gly Arg Glu Met Ala Asn Ile Gly Gln Gln Ser Asn Gln
    370                 375                 380
Leu Pro Ser Pro Val Ile Pro Val Pro Thr Asp Asp Ser Thr Tyr Thr
385                 390                 395                 400
Asn Tyr Leu Arg Thr Tyr Thr Tyr Asp Arg Gly Gly Asn Leu Val Gln
            405                 410                 415
Ile Arg His Ser Ser Pro Ala Thr Gln Asn Ser Tyr Thr Thr Asp Ile
            420                 425                 430
Thr Val Ser Ser Arg Ser Asn Arg Ala Val Leu Ser Thr Leu Thr Thr
        435                 440                 445
Asp Pro Thr Arg Val Asp Ala Leu Phe Asp Ser Gly Gly His Gln Lys
    450                 455                 460
Met Leu Ile Pro Gly Gln Asn Leu Asp Trp Asn Ile Arg Gly Glu Leu
465                 470                 475                 480
Gln Arg Val Thr Pro Val Ser Arg Glu Asn Ser Ser Asp Ser Glu Trp
            485                 490                 495
Tyr Arg Tyr Ser Ser Asp Gly Met Arg Leu Leu Lys Val Ser Glu Gln
            500                 505                 510
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Gln Thr Gly Asn Ser Thr Gln Val Gln Arg Val Thr Tyr Leu Pro Gly
          515   520   525
Leu Glu Leu Arg Thr Thr Gly Val Ala Asp Lys Thr Thr Glu Asp Leu
          530   535   540
Gln Val Ile Thr Val Gly Glu Ala Gly Arg Ala Gln Val Arg Val Leu
545   550   555   560
His Trp Glu Ser Gly Lys Pro Thr Asp Ile Asp Asn Asn Gln Val Arg
              565   570   575
Tyr Ser Tyr Asp Asn Leu Leu Gly Ser Ser Gln Leu Glu Leu Asp Ser
          580   585   590
Glu Gly Gln Ile Leu Ser Gln Glu Glu Tyr Tyr Pro Tyr Gly Gly Thr
          595   600   605
Ala Ile Trp Ala Ala Arg Asn Gln Thr Glu Ala Ser Tyr Lys Phe Ile
      610   615   620
Arg Tyr Ser Gly Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly
625   630   635   640
Tyr Arg Tyr Tyr Gln Pro Trp Val Gly Arg Trp Leu Ser Ala Asp Pro
              645   650   655
Ala Gly Thr Val Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn
          660   665   670
Pro Ile Thr Leu Thr Asp His Asp Gly Leu Ala Pro Ser Pro Asn Arg
          675   680   685
Asn Arg Asn Thr Phe Trp Phe Ala Ser Phe Leu Phe Arg Lys Pro Asp
      690   695   700
Glu Gly Met Ser Ala Ser Met Arg Arg Gly Gln Lys Ile Gly Arg Ala
705   710   715   720
Ile Ala Gly Gly Ile Ala Ile Gly Gly Leu Ala Ala Thr Ile Ala Ala
              725   730   735
Thr Ala Gly Ala Ala Ile Pro Val Ile Leu Gly Val Ala Ala Val Gly
          740   745   750
Ala Gly Ile Gly Ala Leu Met Gly Tyr Asn Val Gly Ser Leu Leu Glu
          755   760   765
Lys Gly Gly Ala Leu Leu Ala Arg Leu Val Gln Gly Lys Ser Thr Leu
      770   775   780
Val Gln Ser Ala Ala Gly Ala Ala Ala Gly Ala Ser Ser Ala Ala Ala
785   790   795   800
Tyr Gly Ala Arg Ala Gln Gly Val Gly Val Ala Ser Ala Ala Gly Ala
              805   810   815
Val Thr Gly Ala Val Gly Ser Trp Ile Asn Asn Ala Asp Arg Gly Ile
          820   825   830
Gly Gly Ala Ile Gly Ala Gly Ser Ala Val Gly Thr Ile Asp Thr Met
          835   840   845
Leu Gly Thr Ala Ser Thr Leu Thr His Glu Val Gly Ala Ala Ala Gly
      850   855   860
Gly Ala Ala Gly Gly Met Ile Thr Gly Thr Gln Gly Ser Thr Arg Ala
865   870   875   880
Gly Ile His Ala Gly Ile Gly Thr Tyr Tyr Gly Ser Trp Ile Gly Phe
              885   890   895
Gly Leu Asp Val Ala Ser Asn Pro Ala Gly His Leu Ala Asn Tyr Ala
          900   905   910
Val Gly Tyr Ala Ala Gly Leu Gly Ala Glu Met Ala Val Asn Arg Ile
          915   920   925
Met Gly Gly Gly Phe Leu Ser Arg Leu Leu Gly Arg Val Val Ser Pro
      930   935   940
Tyr Ala Ala Gly Leu Ala Arg Gln Leu Val His Phe Ser Val Ala Arg
945   950   955   960
Pro Val Phe Glu Pro Ile Phe Ser Val Leu Gly Gly Leu Val Gly Gly
              965   970   975
Ile Gly Thr Gly Leu His Arg Val Met Gly Arg Glu Ser Trp Ile Ser
          980   985   990
Arg Ala Leu Ser Ala Ala Gly Ser Gly Ile Asp His Val Ala Gly Met
      995   1000   1005
Ile Gly Asn Gln Ile Arg Gly Arg Val Leu Thr Thr Thr Gly Ile Ala

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           1010                    1015                    1020
Asn Ala Ile Asp Tyr Gly Thr Ser Ala Val Gly Ala Ala Arg Arg Val
1025                    1030                    1035                    1040
Phe Ser Leu
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Arg Arg Arg Arg Glu
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<212>  DNA
<213>  plasmid-Tn10

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<213>  Photorhabdus luminescens

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Leu Val Thr Gly Tyr Met Asn Phe Val Ala Pro Thr Leu Lys Gly Val
            20                  25                  30
Ser Gly Gln Pro Val Thr Val Glu Asp Leu Tyr Glu Tyr Leu Leu Ile
        35                  40                  45
Asp Pro Glu Val Ala Asp Glu Val Glu Thr Ser Arg Val Ala Gln Ala
    50                  55                  60
Ile Ala Ser Ile Gln Gln Tyr Met Thr Arg Leu Val Asn Gly Ser Glu
65                  70                  75                  80
Pro Gly Arg Gln Ala Met Glu Pro Ser Thr Ala Asn Glu Trp Arg Asp
                85                  90                  95
Asn Asp Asn Gln Tyr Ala Ile Trp Ala Ala Gly Ala Glu Val Arg Asn
                100                 105                 110
Tyr Ala Glu Asn Tyr Ile Ser Pro Ile Thr Arg Gln Glu Lys Ser His
        115                 120                 125
Tyr Phe Ser Glu Leu Glu Thr Thr Leu Asn Gln Asn Arg Leu Asp Pro
        130                 135                 140
Asp Arg Val Gln Asp Ala Val Leu Ala Tyr Leu Asn Glu Phe Glu Ala
145                 150                 155                 160
Val Ser Asn Leu Tyr Val Leu Ser Gly Tyr Ile Asn Gln Asp Lys Phe
                165                 170                 175
Asp Gln Ala Ile Tyr Tyr Phe Ile Gly Arg Thr Thr Thr Lys Pro Tyr
                180                 185                 190
Arg Tyr Tyr Trp Arg Gln Met Asp Leu Ser Lys Asn Arg Gln Asp Pro
        195                 200                 205
Ala Gly Asn Pro Val Thr Pro Asn Cys Trp Asn Asp Trp Gln Glu Ile
    210                 215                 220
Thr Leu Pro Leu Ser Gly Asp Thr Val Leu Glu His Thr Val Arg Pro
225                 230                 235                 240
Val Phe Tyr Asn Asp Arg Leu Tyr Val Ala Trp Val Glu Arg Asp Pro
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                    245                 250                 255
Ala Val Gln Lys Asp Ala Asp Gly Lys Asn Ile Gly Lys Thr His Ala
                260                 265                 270
Tyr Asn Ile Lys Phe Gly Tyr Lys Arg Tyr Asp Asp Thr Trp Thr Ala
                275                 280                 285
Pro Asn Thr Thr Thr Leu Met Thr Gln Gln Ala Gly Glu Ser Ser Glu
            290                 295                 300
Thr Gln Arg Ser Ser Leu Leu Ile Asp Glu Ser Ser Thr Thr Leu Arg
305                 310                 315                 320
Gln Val Asn Leu Leu Ala Thr Thr Asp Phe Ser Ile Asp Pro Thr Glu
                325                 330                 335
Glu Thr Asp Ser Asn Pro Tyr Gly Arg Leu Met Leu Gly Val Phe Val
                340                 345                 350
Arg Gln Phe Glu Gly Asp Gly Ala Asn Arg Lys Asn Lys Pro Val Val
                355                 360                 365
Tyr Gly Tyr Leu Tyr Cys Asp Ser Ala Phe Asn Arg His Val Leu Arg
        370                 375                 380
Pro Leu Ser Lys Asn Phe Leu Phe Ser Thr Tyr Arg Asp Glu Thr Asp
385                 390                 395                 400
Gly Gln Asn Ser Leu Gln Phe Ala Val Tyr Asp Lys Lys Tyr Val Ile
                405                 410                 415
Thr Lys Val Val Thr Gly Ala Thr Glu Asp Pro Glu Asn Thr Gly Trp
            420                 425                 430
Val Ser Lys Val Asp Asp Leu Lys Gln Gly Thr Thr Gly Ala Tyr Val
            435                 440                 445
Tyr Ile Asp Gln Asp Gly Leu Thr Leu His Ile Gln Thr Thr Thr Asn
        450                 455                 460
Gly Asp Phe Ile Asn Arg His Thr Phe Gly Tyr Asn Asp Leu Val Tyr
465                 470                 475                 480
Asp Ser Lys Ser Gly Tyr Gly Phe Thr Trp Ser Gly Asn Glu Gly Phe
                485                 490                 495
Tyr Leu Asp Tyr His Asp Gly Asn Tyr Tyr Thr Phe His Asn Ala Ile
            500                 505                 510
Ile Asn Tyr Tyr Pro Ser Gly Tyr Gly Gly Gly Ser Val Pro Asn Gly
        515                 520                 525
Thr Trp Ala Leu Glu Gln Arg Ile Asn Glu Gly Trp Ala Ile Ala Pro
        530                 535                 540
Leu Leu Asp Thr Leu His Thr Val Thr Val Lys Gly Ser Tyr Ile Ala
545                 550                 555                 560
Trp Glu Gly Glu Thr Pro Thr Gly Tyr Asn Leu Tyr Ile Pro Asp Gly
                565                 570                 575
Thr Val Leu Leu Asp Trp Phe Asp Lys Ile Asn Phe Ala Ile Gly Leu
                580                 585                 590
Asn Lys Leu Glu Ser Val Phe Thr Ser Pro Asp Trp Pro Thr Leu Thr
            595                 600                 605
Thr Ile Lys Asn Phe Ser Lys Ile Ala Asp Asn Arg Lys Phe Tyr Gln
        610                 615                 620
Glu Ile Asn Ala Glu Thr Ala Asp Gly Arg Asn Leu Phe Lys Arg Tyr
625                 630                 635                 640
Ser Thr Gln Thr Phe Gly Leu Thr Ser Gly Ala Thr Tyr Ser Thr Thr
                645                 650                 655
Tyr Thr Leu Ser Glu Ala Asp Phe Ser Thr Asp Pro Asp Lys Asn Tyr
            660                 665                 670
Leu Gln Val Cys Leu Asn Val Val Trp Asp His Tyr Asp Arg Pro Ser
        675                 680                 685
Gly Lys Lys Gly Ala Tyr Ser Trp Val Ser Lys Trp Phe Asn Val Tyr
        690                 695                 700
Val Ala Leu Gln Asp Ser Lys Ala Pro Asp Ala Ile Pro Arg Leu Val
705                 710                 715                 720
Ser Arg Tyr Asp Ser Lys Arg Gly Leu Val Gln Tyr Leu Asp Phe Trp
                725                 730                 735
Thr Ser Ser Leu Pro Ala Lys Thr Arg Leu Asn Thr Thr Phe Val Arg
            740                 745                 750
```

Thr Leu Ile Glu Lys Ala Asn Leu Gly Leu Asp Ser Leu Leu Asp Tyr
     755   760   765

Thr Leu Gln Ala Asp Pro Ser Leu Glu Ala Asp Leu Val Thr Asp Gly
  770   775   780

Lys Ser Glu Pro Met Asp Phe Asn Gly Ser Asn Gly Leu Tyr Phe Trp
785   790   795   800

Glu Leu Phe Phe His Leu Pro Phe Leu Val Ala Thr Arg Phe Ala Asn
        805   810   815

Glu Gln Gln Phe Ser Pro Ala Gln Lys Ser Leu His Tyr Ile Phe Asp
      820   825   830

Pro Ala Met Lys Asn Lys Pro His Asn Ala Pro Ala Tyr Trp Asn Val
     835   840   845

Arg Pro Leu Val Glu Gly Asn Ser Asp Leu Ser Arg His Leu Asp Asp
  850   855   860

Ser Ile Asp Pro Asp Thr Gln Ala Tyr Ala His Pro Val Ile Tyr Gln
865   870   875   880

Lys Ala Val Phe Ile Ala Tyr Val Ser Asn Leu Ile Ala Gln Gly Asp
        885   890   895

Met Trp Tyr Arg Gln Leu Thr Arg Asp Gly Leu Thr Gln Ala Arg Val
      900   905   910

Tyr Tyr Asn Leu Ala Ala Glu Leu Leu Gly Pro Arg Pro Asp Val Ser
      915   920   925

Leu Ser Ser Ile Trp Thr Pro Gln Thr Leu Asp Thr Leu Ala Ala Gly
  930   935   940

Gln Lys Ala Val Leu Arg Asp Phe Glu His Gln Leu Ala Asn Ser Asp
945   950   955   960

Thr Ala Leu Pro Ala Leu Pro Gly Arg Asn Val Ser Tyr Leu Lys Leu
        965   970   975

Ala Asp Asn Gly Tyr Phe Asn Glu Pro Leu Asn Val Leu Met Leu Ser
        980   985   990

His Trp Asp Thr Leu Asp Ala Arg Leu Tyr Asn Leu Arg His Asn Leu
      995   1000   1005

Thr Val Asp Gly Lys Pro Leu Ser Leu Pro Leu Tyr Ala Ala Pro Val
  1010   1015   1020

Asp Pro Val Ala Leu Leu Ala Gln Arg Ala Gln Ser Gly Thr Leu Thr
1025   1030   1035   1040

Asn Gly Val Ser Gly Ala Met Leu Thr Val Pro Pro Tyr Arg Phe Ser
        1045   1050   1055

Ala Met Leu Pro Arg Ala Tyr Ser Ala Val Gly Thr Leu Thr Ser Phe
        1060   1065   1070

Gly Gln Asn Leu Leu Ser Leu Leu Glu Arg Ser Glu Arg Ala Cys Gln
        1075   1080   1085

Glu Glu Leu Ala Gln Gln Gln Leu Leu Asp Met Ser Ser Tyr Ala Ile
  1090   1095   1100

Thr Leu Gln Gln Gln Ala Leu Asp Gly Leu Ala Ala Asp Arg Leu Ala
1105   1110   1115   1120

Leu Leu Ala Ser Gln Ala Thr Ala Gln Gln Arg His Asp His Tyr Tyr
        1125   1130   1135

Thr Leu Tyr Gln Asn Asn Ile Ser Ser Ala Glu Gln Leu Val Met Asp
        1140   1145   1150

Thr Gln Thr Ser Ala Gln Ser Leu Ile Ser Ser Ser Thr Gly Val Gln
        1155   1160   1165

Thr Ala Ser Gly Ala Leu Lys Val Ile Pro Asn Ile Phe Gly Leu Ala
  1170   1175   1180

Asp Gly Gly Ser Arg Tyr Glu Gly Val Thr Glu Ala Ile Ala Ile Gly
1185   1190   1195   1200

Leu Met Ala Ala Gly Gln Ala Thr Ser Val Val Ala Glu Arg Leu Ala
        1205   1210   1215

Thr Thr Glu Asn Tyr Arg Arg Arg Arg Glu Glu Trp Gln Ile Gln Tyr
        1220   1225   1230

Gln Gln Ala Gln Ser Glu Val Asp Ala Leu Gln Lys Gln Leu Asp Ala
      1235   1240   1245

Leu Ala Val Arg Glu Lys Ala Ala Gln Thr Ser Leu Gln Gln Ala Lys

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            1250                 1255                    1260
Ala Gln Gln Val Gln Ile Arg Thr Met Leu Thr Tyr Leu Thr Thr Arg
1265                 1270                1275                    1280
Phe Thr Gln Ala Thr Leu Tyr Gln Trp Leu Ser Gly Gln Leu Ser Ala
                1285                1290                1295
Leu Tyr Tyr Gln Ala Tyr Asp Ala Val Val Ala Leu Cys Leu Ser Ala
           1300                1305                1310
Gln Ala Cys Trp Gln Tyr Glu Leu Gly Asp Tyr Ala Thr Thr Phe Ile
         1315                1320                1325
Gln Thr Gly Thr Trp Asn Asp His Tyr Arg Gly Leu Gln Val Gly Glu
    1330                1335                1340
Thr Leu Gln Leu Asn Leu His Gln Met Glu Ala Ala Tyr Leu Val Arg
1345                    1350                1355                    1360
His Glu Arg Arg Leu Asn Val Ile Arg Thr Val Ser Leu Lys Ser Leu
                1365                1370                1375
Leu Gly Asp Asp Gly Phe Gly Lys Leu Lys Thr Glu Gly Lys Val Asp
           1380                1385                1390
Phe Pro Leu Ser Glu Lys Leu Phe Asp Asn Asp Tyr Pro Gly His Tyr
           1395                1400                1405
Leu Arg Gln Ile Lys Thr Val Ser Val Thr Leu Pro Thr Leu Val Gly
    1410                1415                1420
Pro Tyr Gln Asn Val Lys Ala Thr Leu Thr Gln Thr Ser Ser Ser Ile
1425                1430                1435                    1440
Leu Leu Ala Ala Asp Ile Asn Gly Val Lys Arg Leu Asn Asp Pro Thr
                1445                1450                1455
Gly Lys Glu Gly Asp Ala Thr His Ile Val Thr Asn Leu Arg Ala Ser
           1460                1465                1470
Gln Gln Val Ala Leu Ser Ser Gly Ile Asn Asp Ala Gly Ser Phe Glu
           1475                1480                1485
Leu Arg Leu Glu Asp Glu Arg Tyr Leu Ser Phe Glu Gly Thr Gly Ala
    1490                1495                1500
Val Ser Lys Trp Thr Leu Asn Phe Pro Arg Ser Val Asp Glu His Ile
1505                1510                1515                    1520
Asp Asp Lys Thr Leu Lys Ala Asp Glu Met Gln Ala Ala Leu Leu Ala
           1525                1530                1535
Asn Met Asp Asp Val Leu Val Gln Val His Tyr Thr Ala Cys Asp Gly
           1540                1545                1550
Gly Ala Ser Phe Ala Asn Gln Val Lys Lys Thr Leu Ser
    1555                1560                1565
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<212> PRT
<213> Photorhabdus luminescens

<400> 13

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Met Gln Asn Ser Leu Ser Ser Thr Ile Asp Thr Ile Cys Gln Lys Leu
 1               5                   10                  15
Gln Leu Thr Cys Pro Ala Glu Ile Ala Leu Tyr Pro Phe Asp Thr Phe
            20                  25                  30
Arg Glu Lys Thr Arg Gly Met Val Asn Trp Gly Glu Ala Lys Arg Ile
    35                  40                  45
Tyr Glu Ile Ala Gln Ala Glu Gln Asp Arg Asn Leu Leu His Glu Lys
    50                  55                  60
Arg Ile Phe Ala Tyr Ala Asn Pro Leu Leu Lys Asn Ala Val Arg Leu
65                  70                  75                  80
Gly Thr Arg Gln Met Leu Gly Phe Ile Gln Gly Tyr Ser Asp Leu Phe
                85                  90                  95
Gly Asn Arg Ala Asp Asn Tyr Ala Ala Pro Gly Ser Val Ala Ser Met
           100                 105                 110
Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asn
           115                 120                 125
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Leu His Asp Ser Ser Ser Ile Tyr Tyr Leu Asp Lys Arg Arg Pro Asp
130   135   140
Leu Ala Ser Leu Met Leu Ser Gln Lys Asn Met Asp Glu Glu Ile Ser
145   150   155   160
Thr Leu Ala Leu Ser Asn Glu Leu Cys Leu Ala Gly Ile Glu Thr Lys
             165   170   175
Thr Gly Lys Ser Gln Asp Glu Val Met Asp Met Leu Ser Thr Tyr Arg
             180   185   190
Leu Ser Gly Glu Thr Pro Tyr His His Ala Tyr Glu Thr Val Arg Glu
         195   200   205
Ile Val His Glu Arg Asp Pro Gly Phe Arg His Leu Ser Gln Ala Pro
210   215   220
Ile Val Ala Ala Lys Leu Asp Pro Val Thr Leu Leu Gly Ile Ser Ser
225   230   235   240
His Ile Ser Pro Glu Leu Tyr Asn Leu Leu Ile Glu Glu Ile Pro Glu
             245   250   255
Lys Asp Glu Ala Ala Leu Asp Thr Leu Tyr Lys Thr Asn Phe Gly Asp
             260   265   270
Ile Thr Thr Ala Gln Leu Met Ser Pro Ser Tyr Leu Ala Arg Tyr Tyr
         275   280   285
Gly Val Ser Pro Glu Asp Ile Ala Tyr Val Thr Thr Ser Leu Ser His
    290   295   300
Val Gly Tyr Ser Ser Asp Ile Leu Val Ile Pro Leu Val Asp Gly Val
305   310   315   320
Gly Lys Met Glu Val Val Arg Val Thr Arg Thr Pro Ser Asp Asn Tyr
             325   330   335
Thr Ser Gln Thr Asn Tyr Ile Glu Leu Tyr Pro Gln Gly Gly Asp Asn
             340   345   350
Tyr Leu Ile Lys Tyr Asn Leu Ser Asn Ser Phe Gly Leu Asp Asp Phe
         355   360   365
Tyr Leu Gln Tyr Lys Asp Gly Ser Ala Asp Trp Thr Glu Ile Ala His
370   375   380
Asn Pro Tyr Pro Asp Met Val Ile Asn Gln Lys Tyr Glu Ser Gln Ala
385   390   395   400
Thr Ile Lys Arg Ser Asp Ser Asp Asn Ile Leu Ser Ile Gly Leu Gln
             405   410   415
Arg Trp His Ser Gly Ser Tyr Asn Phe Ala Ala Ala Asn Phe Lys Ile
         420   425   430
Asp Gln Tyr Ser Pro Lys Ala Phe Leu Leu Lys Met Asn Lys Ala Ile
         435   440   445
Arg Leu Leu Lys Ala Thr Gly Leu Ser Phe Ala Thr Leu Glu Arg Ile
    450   455   460
Val Asp Ser Val Asn Ser Thr Lys Ser Ile Thr Val Glu Val Leu Asn
465   470   475   480
Lys Val Tyr Arg Val Lys Phe Tyr Ile Asp Arg Tyr Gly Ile Ser Glu
             485   490   495
Glu Thr Ala Ala Ile Leu Ala Asn Ile Asn Ile Ser Gln Gln Ala Val
             500   505   510
Gly Asn Gln Leu Ser Gln Phe Glu Gln Leu Phe Asn His Pro Pro Leu
         515   520   525
Asn Gly Ile Arg Tyr Glu Ile Ser Glu Asp Asn Ser Lys His Leu Pro
    530   535   540
Asn Pro Asp Leu Asn Leu Lys Pro Asp Ser Thr Gly Asp Asp Gln Arg
545   550   555   560
Lys Ala Val Leu Lys Arg Ala Phe Gln Val Asn Ala Ser Glu Leu Tyr
             565   570   575
Gln Met Leu Leu Ile Thr Asp Arg Lys Glu Asp Gly Val Ile Lys Asn
         580   585   590
Asn Leu Glu Asn Leu Ser Asp Leu Tyr Leu Val Ser Leu Leu Ala Gln
    595   600   605
Ile His Asn Leu Thr Ile Ala Glu Leu Asn Ile Leu Leu Val Ile Cys
610   615   620
Gly Tyr Gly Asp Thr Asn Ile Tyr Gln Ile Thr Asp Asp Asn Leu Ala

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625                 630                 635                     640
Lys Ile Val Glu Thr Leu Leu Trp Ile Thr Gln Trp Leu Lys Thr Gln
                645                 650                 655
Lys Trp Thr Val Thr Asp Leu Phe Leu Met Thr Thr Ala Thr Tyr Ser
                660                 665                 670
Thr Thr Leu Thr Pro Glu Ile Ser Asn Leu Thr Ala Thr Leu Ser Ser
                675                 680                 685
Thr Leu His Gly Lys Glu Ser Leu Ile Gly Glu Asp Leu Lys Arg Ala
        690                 695                 700
Met Ala Pro Cys Phe Thr Ser Ala Leu His Leu Thr Ser Gln Glu Val
705                 710                 715                     720
Ala Tyr Asp Leu Leu Leu Trp Ile Asp Gln Ile Gln Pro Ala Gln Ile
                725                 730                 735
Thr Val Asp Gly Phe Trp Glu Glu Val Gln Thr Thr Pro Thr Ser Leu
                740                 745                 750
Lys Val Ile Thr Phe Ala Gln Val Leu Ala Gln Leu Ser Leu Ile Tyr
                755                 760                 765
Arg Arg Ile Gly Leu Ser Glu Thr Glu Leu Ser Leu Ile Val Thr Gln
        770                 775                 780
Ser Ser Leu Leu Val Ala Gly Lys Ser Ile Leu Asp His Gly Leu Leu
785                 790                 795                     800
Thr Leu Met Ala Leu Glu Gly Phe His Thr Trp Val Asn Gly Leu Gly
                805                 810                 815
Gln His Ala Ser Leu Ile Leu Ala Ala Leu Lys Asp Gly Ala Leu Thr
                820                 825                 830
Val Thr Asp Val Ala Gln Ala Met Asn Lys Glu Glu Ser Leu Leu Gln
        835                 840                 845
Met Ala Ala Asn Gln Val Glu Lys Asp Leu Thr Lys Leu Thr Ser Trp
850                 855                 860
Thr Gln Ile Asp Ala Ile Leu Gln Trp Leu Gln Met Ser Ser Ala Leu
865                 870                 875                     880
Ala Val Ser Pro Leu Asp Leu Ala Gly Met Met Ala Leu Lys Tyr Gly
                885                 890                 895
Ile Asp His Asn Tyr Ala Ala Trp Gln Ala Ala Ala Ala Ala Leu Met
                900                 905                 910
Ala Asp His Ala Asn Gln Ala Gln Lys Lys Leu Asp Glu Thr Phe Ser
        915                 920                 925
Lys Ala Leu Cys Asn Tyr Tyr Ile Asn Ala Val Val Asp Ser Ala Ala
        930                 935                 940
Gly Val Arg Asp Arg Asn Gly Leu Tyr Thr Tyr Leu Leu Ile Asp Asn
945                 950                 955                     960
Gln Val Ser Ala Asp Val Ile Thr Ser Arg Ile Ala Glu Ala Ile Ala
                965                 970                 975
Gly Ile Gln Leu Tyr Val Asn Arg Ala Leu Asn Arg Asp Glu Gly Gln
                980                 985                 990
Leu Ala Ser Asp Val Ser Thr Arg Gln Phe Phe Thr Asp Trp Glu Arg
        995                 1000                1005
Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Glu Leu Val Tyr
        1010                1015                1020
Tyr Pro Glu Asn Tyr Val Asp Pro Thr Gln Arg Ile Gly Gln Thr Lys
1025                1030                1035                    1040
Met Met Asp Ala Leu Leu Gln Ser Ile Asn Gln Ser Gln Leu Asn Ala
                1045                1050                1055
Asp Thr Val Glu Asp Ala Phe Lys Thr Tyr Leu Thr Ser Phe Glu Gln
                1060                1065                1070
Val Ala Asn Leu Lys Val Ile Ser Ala Tyr His Asp Asn Val Asn Val
                1075                1080                1085
Asp Gln Gly Leu Thr Tyr Phe Ile Gly Ile Asp Gln Ala Ala Pro Gly
        1090                1095                1100
Thr Tyr Tyr Trp Arg Ser Val Asp His Ser Lys Cys Glu Asn Gly Lys
1105                1110                1115                    1120
Phe Ala Ala Asn Ala Trp Gly Glu Trp Asn Lys Ile Thr Cys Ala Val
                1125                1130                1135
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Asn Pro Trp Lys Asn Ile Ile Arg Pro Val Val Tyr Met Ser Arg Leu
     1140   1145   1150

Tyr Leu Leu Trp Leu Glu Gln Gln Ser Lys Lys Ser Asp Asp Gly Lys
     1155   1160   1165

Thr Thr Ile Tyr Gln Tyr Asn Leu Lys Leu Ala His Ile Arg Tyr Asp
1170   1175   1180

Gly Ser Trp Asn Thr Pro Phe Thr Phe Asp Val Thr Glu Lys Val Lys
1185   1190   1195   1200

Asn Tyr Thr Ser Ser Thr Asp Ala Ala Glu Ser Leu Gly Leu Tyr Cys
     1205   1210   1215

Thr Gly Tyr Gln Gly Glu Asp Thr Leu Leu Val Met Phe Tyr Ser Met
     1220   1225   1230

Gln Ser Ser Tyr Ser Ser Tyr Thr Asp Asn Asn Ala Pro Val Thr Gly
     1235   1240   1245

Leu Tyr Ile Phe Ala Asp Met Ser Ser Asp Asn Met Thr Asn Ala Gln
     1250   1255   1260

Ala Thr Asn Tyr Trp Asn Asn Ser Tyr Pro Gln Phe Asp Thr Val Met
1265   1270   1275   1280

Ala Asp Pro Asp Ser Asp Asn Lys Lys Val Ile Thr Arg Arg Val Asn
     1285   1290   1295

Asn Arg Tyr Ala Glu Asp Tyr Glu Ile Pro Ser Ser Val Thr Ser Asn
     1300   1305   1310

Ser Asn Tyr Ser Trp Gly Asp His Ser Leu Thr Met Leu Tyr Gly Gly
     1315   1320   1325

Ser Val Pro Asn Ile Thr Phe Glu Ser Ala Ala Glu Asp Leu Arg Leu
     1330   1335   1340

Ser Thr Asn Met Ala Leu Ser Ile Ile His Asn Gly Tyr Ala Gly Thr
1345   1350   1355   1360

Arg Arg Ile Gln Cys Asn Leu Met Lys Gln Tyr Ala Ser Leu Gly Asp
     1365   1370   1375

Lys Phe Ile Ile Tyr Asp Ser Ser Phe Asp Asp Ala Asn Arg Phe Asn
     1380   1385   1390

Leu Val Pro Leu Phe Lys Phe Gly Lys Asp Glu Asn Ser Asp Asp Ser
     1395   1400   1405

Ile Cys Ile Tyr Asn Glu Asn Pro Ser Ser Glu Asp Lys Lys Trp Tyr
     1410   1415   1420

Phe Ser Ser Lys Asp Asp Asn Lys Thr Ala Asp Tyr Asn Gly Gly Thr
1425   1430   1435   1440

Gln Cys Ile Asp Ala Gly Thr Ser Asn Lys Asp Phe Tyr Tyr Asn Leu
     1445   1450   1455

Gln Glu Ile Glu Val Ile Ser Val Thr Gly Gly Tyr Trp Ser Ser Tyr
     1460   1465   1470

Lys Ile Ser Asn Pro Ile Asn Ile Asn Thr Gly Ile Asp Ser Ala Lys
     1475   1480   1485

Val Lys Val Thr Val Lys Ala Gly Gly Asp Asp Gln Ile Phe Thr Ala
     1490   1495   1500

Asp Asn Ser Thr Tyr Val Pro Gln Gln Pro Ala Pro Ser Phe Glu Glu
1505   1510   1515   1520

Met Ile Tyr Gln Phe Asn Asn Leu Thr Ile Asp Cys Lys Asn Leu Asn
     1525   1530   1535

Phe Ile Asp Asn Gln Ala His Ile Glu Ile Asp Phe Thr Ala Thr Ala
     1540   1545   1550

Gln Asp Gly Arg Phe Leu Gly Ala Glu Thr Phe Ile Ile Pro Val Thr
     1555   1560   1565

Lys Lys Val Leu Gly Thr Glu Asn Val Ile Ala Leu Tyr Ser Glu Asn
     1570   1575   1580

Asn Gly Val Gln Tyr Met Gln Ile Gly Ala Tyr Arg Thr Arg Leu Asn
1585   1590   1595   1600

Thr Leu Phe Ala Gln Leu Val Ser Arg Ala Asn Arg Gly Ile Asp
     1605   1610   1615

Ala Val Leu Ser Met Glu Thr Gln Asn Ile Gln Glu Pro Gln Leu Gly
     1620   1625   1630

Ala Gly Thr Tyr Val Gln Leu Val Leu Asp Lys Tyr Asp Glu Ser Ile

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            1635              1640                  1645
His Gly Thr Asn Lys Ser Phe Ala Ile Glu Tyr Val Asp Ile Phe Lys
    1650              1655                  1660
Glu Asn Asp Ser Phe Val Ile Tyr Gln Gly Glu Leu Ser Glu Thr Ser
1665              1670                  1675              1680
Gln Thr Val Val Lys Val Phe Leu Ser Tyr Phe Ile Glu Ala Thr Gly
        1685              1690                  1695
Asn Lys Asn His Leu Trp Val Arg Ala Lys Tyr Gln Lys Glu Thr Thr
        1700              1705                  1710
Asp Lys Ile Leu Phe Asp Arg Thr Asp Glu Lys Asp Pro His Gly Trp
        1715              1720                  1725
Phe Leu Ser Asp Asp His Lys Thr Phe Ser Gly Leu Ser Ser Ala Gln
        1730              1735                  1740
Ala Leu Lys Asn Asp Ser Glu Pro Met Asp Phe Ser Gly Ala Asn Ala
1745              1750                  1755              1760
Leu Tyr Phe Trp Glu Leu Phe Tyr Tyr Thr Pro Met Met Met Ala His
            1765              1770                  1775
Arg Leu Leu Gln Glu Gln Asn Phe Asp Ala Ala Asn His Trp Phe Arg
        1780              1785                  1790
Tyr Val Trp Ser Pro Ser Gly Tyr Ile Val Asp Gly Lys Ile Ala Ile
        1795              1800                  1805
Tyr His Trp Asn Val Arg Pro Leu Glu Glu Asp Thr Ser Trp Asn Ala
    1810              1815                  1820
Gln Gln Leu Asp Ser Thr Asp Pro Asp Ala Val Ala Gln Asp Asp Pro
1825              1830                  1835              1840
Met His Tyr Lys Val Ala Thr Phe Met Ala Thr Leu Asp Leu Leu Met
            1845              1850                  1855
Ala Arg Gly Asp Ala Ala Tyr Arg Gln Leu Glu Arg Asp Thr Leu Ala
        1860              1865                  1870
Glu Ala Lys Met Trp Tyr Thr Gln Ala Leu Asn Leu Leu Gly Asp Glu
        1875              1880                  1885
Pro Gln Val Met Leu Ser Thr Thr Trp Ala Asn Pro Thr Leu Gly Asn
    1890              1895                  1900
Ala Ala Ser Lys Thr Thr Gln Gln Val Arg Gln Gln Val Leu Thr Gln
1905              1910                  1915              1920
Leu Arg Leu Asn Ser Arg Val Lys Thr Pro Leu Leu Gly Thr Ala Asn
            1925              1930                  1935
Ser Leu Thr Ala Leu Phe Leu Pro Gln Glu Asn Ser Lys Leu Lys Gly
        1940              1945                  1950
Tyr Trp Arg Thr Leu Ala Gln Arg Met Phe Asn Leu Arg His Asn Leu
        1955              1960                  1965
Ser Ile Asp Gly Gln Pro Leu Ser Leu Pro Leu Tyr Ala Lys Pro Ala
    1970              1975                  1980
Asp Pro Lys Ala Leu Leu Ser Ala Ala Val Ser Ala Ser Gln Gly Gly
1985              1990                  1995              2000
Ala Asp Leu Pro Lys Ala Pro Leu Thr Ile His Arg Phe Pro Gln Met
            2005              2010                  2015
Leu Glu Gly Ala Arg Gly Leu Val Asn Gln Leu Ile Gln Phe Gly Ser
        2020              2025                  2030
Ser Leu Leu Gly Tyr Ser Glu Arg Gln Asp Ala Glu Ala Met Ser Gln
        2035              2040                  2045
Leu Leu Gln Thr Gln Ala Ser Glu Leu Ile Leu Thr Ser Ile Arg Met
    2050              2055                  2060
Gln Asp Asn Gln Leu Ala Glu Leu Asp Ser Glu Lys Thr Ala Leu Gln
2065              2070                  2075              2080
Val Ser Leu Ala Gly Val Gln Gln Arg Phe Asp Ser Tyr Ser Gln Leu
            2085              2090                  2095
Tyr Glu Glu Asn Ile Asn Ala Gly Glu Gln Arg Ala Leu Ala Leu Arg
        2100              2105                  2110
Ser Glu Ser Ala Ile Glu Ser Gln Gly Ala Gln Ile Ser Arg Met Ala
    2115              2120                  2125
Gly Ala Gly Val Asp Met Ala Pro Asn Ile Phe Gly Leu Ala Asp Gly
    2130              2135                  2140
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Gly Met His Tyr Gly Ala Ile Ala Tyr Ala Ile Ala Asp Gly Ile Glu
2145              2150            2155              2160
Leu Ser Ala Ser Ala Lys Met Val Asp Ala Glu Lys Val Ala Gln Ser
              2165            2170              2175
Glu Ile Tyr Arg Arg Arg Arg Gln Glu Trp Lys Ile Gln Arg Asp Asn
          2180            2185            2190
Ala Gln Ala Glu Ile Asn Gln Leu Asn Ala Gln Leu Glu Ser Leu Ser
          2195            2200            2205
Ile Arg Arg Glu Ala Ala Glu Met Gln Lys Glu Tyr Leu Lys Thr Gln
      2210            2215            2220
Gln Ala Gln Ala Gln Ala Gln Leu Thr Phe Leu Arg Ser Lys Phe Ser
2225              2230            2235              2240
Asn Gln Ala Leu Tyr Ser Trp Leu Arg Gly Arg Leu Ser Gly Ile Tyr
              2245            2250            2255
Phe Gln Phe Tyr Asp Leu Ala Val Ser Arg Cys Leu Met Ala Glu Gln
          2260            2265            2270
Ser Tyr Gln Trp Glu Ala Asn Asp Asn Ser Ile Ser Phe Val Lys Pro
          2275            2280            2285
Gly Ala Trp Gln Gly Thr Tyr Ala Gly Leu Leu Cys Gly Glu Ala Leu
      2290            2295            2300
Ile Gln Asn Leu Ala Gln Met Glu Glu Ala Tyr Leu Lys Trp Glu Ser
2305            2310            2315              2320
Arg Ala Leu Glu Val Glu Arg Thr Val Ser Leu Ala Val Val Tyr Asp
              2325            2330            2335
Ser Leu Glu Gly Asn Asp Arg Phe Asn Leu Ala Glu Gln Ile Pro Ala
          2340            2345            2350
Leu Leu Asp Lys Gly Glu Gly Thr Ala Gly Thr Lys Glu Asn Gly Leu
          2355            2360            2365
Ser Leu Ala Asn Ala Ile Leu Ser Ala Ser Val Lys Leu Ser Asp Leu
      2370            2375            2380
Lys Leu Gly Thr Asp Tyr Pro Asp Ser Ile Val Gly Ser Asn Lys Val
2385            2390            2395              2400
Arg Arg Ile Lys Gln Ile Ser Val Ser Leu Pro Ala Leu Val Gly Pro
              2405            2410            2415
Tyr Gln Asp Val Gln Ala Met Leu Ser Tyr Gly Gly Ser Thr Gln Leu
          2420            2425            2430
Pro Lys Gly Cys Ser Ala Leu Ala Val Ser His Gly Thr Asn Asp Ser
          2435            2440            2445
Gly Gln Phe Gln Leu Asp Phe Asn Asp Gly Lys Tyr Leu Pro Phe Glu
      2450            2455            2460
Gly Ile Ala Leu Asp Asp Gln Gly Thr Leu Asn Leu Gln Phe Pro Asn
2465            2470            2475              2480
Ala Thr Asp Lys Gln Lys Ala Ile Leu Gln Thr Met Ser Asp Ile Ile
              2485            2490            2495
Leu His Ile Arg Tyr Thr Ile Arg
              2500
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